

BEHAVIORAL STRATEGIES FOR COPING
WITH CHRONIC PAIN

By

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The purpose of this study was to investigate the effects of three different behavioral coping strategies on the three components of the pain experience in a chronic pain population.

Forty chronic pain patients diagnosed as having either rheumatoid- or osteoarthritis were randomly placed into one of four groups: 1) those receiving instruction in relaxation exercises, 2) those receiving instruction in emotive-imagery exercises, 3) those receiving instruction in cognitive-evaluative training, and 4) those receiving no instructions (control group). Subjects were first administered the McGill Pain questionnaire (MPQ), an instrument designed to measure pain change in the three different areas of pain: sensory, affective, and cognitive. Following this procedure, each experimental subject listened to a tape of approximately 30 minutes instructing them in their assigned technique. Control subjects heard no tape. All subjects then completed the MPQ a second time. It was hypothesized that the three components of pain, as measured by the MPQ, would be differentially affected by the three types of treatment instructions: the sensory component would be lowered most by the relaxation tape, the affective component would be lowered most

by the emotive-imagery tape, and the cognitive component would be lowered most by the cognitive-evaluative tape. Control subjects were expected to show no pain reduction.

Results did not support these hypotheses. All subjects exhibited a significant decrease in pain levels, but there was no significant difference between the treatment groups and the control group on measures of pain reduction. These results were interpreted as supportive of the view that the behavioral strategies designed to aid the coping with pain which alleviate pain in experimental subjects cannot be assumed to alleviate pain in chronic pain patients. Suggestions for future investigations in this area include the use of more intensive behavioral treatments for chronic pain patients and the utilization of the MPQ with experimental pain subjects.

CHAPTER ONE

INTRODUCTION

The problem of chronic pain management is one that has been receiving increased attention over the past few decades. It is now being recognized as a relevant problem for clinical psychology, one amenable to psychological interventions. Several very diverse areas of pain research have contributed to the literature's current conceptualization of this problem, as well as to the different modes of approach to intervention, which is the central aim of this study. The nature of the pain experience and the theories explaining its mechanisms are two such areas of contribution. A third one is the topic of pain measurements, and specific to the present study, the development of the McGill Pain Questionnaire as a multi-component measure of the pain experience. Finally, the recent behavioral strategies aimed at coping with pain have also contributed significantly to the area's current conceptualization of this problem. It is necessary, then, that these four areas each be reviewed prior to the statement of the ultimate problem addressed by this paper: measurement of which aspects of the pain experience that different coping strategies may influence.

The Pain Experience

The experience of pain is such a seemingly simple one, and such a universal phenomenon, that it sometimes seems strange to describe it as

being complex and difficult to define. And yet, even the most superficial examination of the pain concept demands that one recognizes it as being complicated, and, in many ways, paradoxical. The simple observation that the same physical stimulus that "causes" intense pain at one point in time can have an almost negligible effect on our senses at another point in time leads one to conclude that pain is a highly variable and maleable experience. This is in direct contrast to the usual layman's view of it as being a direct consequence of the amount of tissue damage to the organism. In addition to the myriad of day-to-day testimonies that support this variable view of pain, pain researchers have documented more extreme examples of the less than comprehensible aspects of the pain experience. Beecher (1959) has presented his observations that during World War II, two-thirds of the severely wounded men in combat hospitals denied having enough pain to necessitate morphine. He juxtaposed this to their vigorous-as-normal complaining when receiving an inept vein puncture. Beecher concluded that "there is no simple direct relationship between the wound per se and the pain experienced. The pain is in very large part determined by other factors and of greatest importance here is the significance of the wound" (p. 165). Similar instances where the significance of a pain alters the subjective experience of it include certain tribal rites described by Melzack (1973). Ceremonies are conducted in which wounds that would appear to cause tremendous pain and tissue damage are inflicted upon selected celebrants, the infliction being a significant honor. Large hooks, for example, are often inserted into a celebrant's abdomen, after which he swings through the air suspended by only this hook, and in no apparent pain. In addition, the wound typically heals quickly after the hook's removal.

Other examples of the puzzling nature of pain include those disorders often categorized under a neurological heading: congenital insensitivity to pain, the neuralgias, the causalgias, and the phenomenon known as "phantom limb" pain. Congenital insensitivity to pain is a syndrome where one is born with an apparent inability to feel pain. Persons with this affliction often have to learn, via purely cognitive means, to avoid harming themselves, as the reflexive avoidance behaviors that frequently follow painful stimuli are not present. People have been known to walk on cracked bones, to bite deep into their tongue while chewing, and to kneel on a hot radiator without awareness of bodily damage (Melzack, 1973).

Neuralgia and causalgia are both pain syndromes characterized by intense, unremitting pain, the former being caused primarily by viral infections of the nerves, vitamin deficiencies, and ingestion of poisonous substances such as arsenic or lead, and the latter more often precipitated by a violent injury to the nerves by such items as bullets. Each exhibits pain patterns that indicate a sort of abnormality within the pain mechanisms of the central nervous system. Patients with neuralgia typically display long delays in their perception of pain, and hypersensitivity to all types of stimulation, even noise or emotional stress. Causalgia patients also exhibit abnormal sensory inputs from the injured nerve, likewise being hypersensitive to any sort of stimulation. Although the nerve may completely heal, the pain continues, eventually becoming independent of the original problem. Surgical interventions at different sites along the nerve pathway may temporarily stop the causalgic pain; however, it has a tendency to return, and--like the neuralgic pain--often remains extremely resistant to similar forms of treatment.

Phantom limb pain has many of the same characteristics as these two "nerve" syndromes. It is a sensation that occurs after the amputation of a body part. The missing part is still "felt," even to the extent that it is sensed to move through space. Tingling sensations in the limb are frequently reported; pain may also be experienced as emanating from the lost limb. Usually these sensations subside. However, in approximately 5-10 per cent of these cases, the pain worsens and becomes more and more severe as time passes (Melzack, 1973). It may become unbearable, being accentuated by slight touches on certain "trigger zones" near the site of amputation, which set off spasms of extreme pain. Conventional surgical procedures, as in the neuralgias and causalgias, often fail to remedy the situation to any permanent extent. All three syndromes present a mystery to physicians and surgeons, as they seem to defy explanation within the current physiological framework.

It can be seen, then, that pain is not as simple an entity as it may first appear. It is not a simple consequence of a given amount of tissue damage, although it does seem to serve the function of alerting one to injury and/or danger. In addition, there do appear to be numerous variables that can alter one's subjective experience of pain. These apparent contradictions lead one to question the existence of any one "real" definition of pain, and to wonder what underlies the concept of the phenomenon called pain.

Historical Antecedents of Current Pain Theories

Historically, pain has been viewed in a variety of different ways by those persons studying it. There has been a consistent tension

between those classifying it in primarily psychological terms, and those positing a more physiological classification. Aristotle, as one of the earliest "philosophers" of pain, viewed it as an emotion: a "passion of the soul," quite distinguishable from the five traditional senses (Dallenbach, 1939). H.R. Marshall, in 1894, posited that pain is an emotional quality or "quale" which colors other sensory events. Even as late as the early 19th century, surgeons are quoted as attributing the joint pains of upper-class women to "emotions" (Merskey & Spear, 1967a). However, amid the physiological discoveries of the late 19th and early 20th centuries in which "pain tracts" and "pain nerves" were located by such notable scientists as von Frey, Bell, Lotze, and Weber, a view of pain as a purely physical sensation came to be widely accepted. Indeed, it is only recently that the part psychology plays in the pain experience has been rerecognized, and that attention has been drawn once again to the emotional elements affecting pain.

There are, of course, inherent dangers in accepting either view as being "correct." Writers in this area have typically relied on seeing pain as being physical or psychological, or even hypothesizing an interaction between the two, where physiological events suddenly "become" psychological ones. As Merskey and Spear (1967b) have observed, however, "Pain is also a psychological state" (p. 63). It may be of greater benefit to speak in terms of separate "languages" that can be used to describe the psychological and physical aspects of pain (Sternbach, 1974), each of which describes the occurrence of pain with equal validity. For example, Sternbach posits "linguistic parallelism," with a psychological language being of more use when dealing with psychogenic pain patients, and a more physical one when addressing the more somatogenic

pain issues, although it must be remembered that the pain experience is really just one experience. Neither pain hurts less; they are but different ways of viewing the same issue.

Nonetheless, on a purely functional level, there may be some utility in recognizing the relative contributions of the psychological component versus the physiological component in a given pain experience. Such a distinction might prove especially useful to those persons designing treatment procedures for chronic pain patients. Hardy, Wolff, and Goodell (1952) took the position that pain, while greater than the sum of its parts, can be studied and analyzed into component parts. They held the pain experience to be composed "not only of pain sensations but of emotional and affective states as well" (p. 24). In other words, for these researchers, pain could be viewed as depending upon an "adequate stimulus" plus other elements, such as fear or excitability.

Likewise, Beecher (1959) advocated a two-component theory of pain: the original sensation versus the reaction. He defined the original sensation as the output from the sensory receptors, including their eruption into consciousness. He saw this as pain's "primary" component. The reaction component was the psychic processing of the whole situation, i.e., the processing by the central nervous system of the original sensation. In addition, morphine and similar analgesic drugs seem to work primarily on the reactive/affective component of pain, but not on the primary/sensational component. He does recognize that the two elements cannot be separated introspectively, but sees this as no barrier to the positing of the existence of these separate aspects.

The most current conceptualization of the separate components of the pain experience is one put forth by Ronald Melzack (1973). Melzack

proposes that there are essentially three distinct aspects of pain: the sensory-discriminative dimension, the motivational-affective dimension, and the cognitive-evaluative dimension. The first roughly corresponds to Beecher's "sensation" component, while the second is similar to his "reaction" component. Melzack's final dimension is an overall evaluation of the pain as perceived by one's cognitive functioning. Melzack and Wall (1962), on the basis of extensive psychological and neurological research, have presented an explanatory model of the process of pain perception that posits physiological mechanisms corresponding to their three-component analysis of pain. This they have called the Gate Control theory. The following is an abbreviated version of its mechanisms, as well as a brief summary of its immediate predecessors.

Gate Control Theory

The traditional theory of pain is usually referred to as the specificity theory. Essentially, it posits that there are certain pain receptors in the skin sensitive to only certain ranges of energy stimulation, that send messages to a pain center in the brain in a virtual one-to-one relationship between number of receptors stimulated and amount of felt pain. Specificity theory has its roots in Muller's theory of "Specific Nerve Energies" (Melzack, 1973) explaining man's sensory system with a unitary model of a direct "line" from the skin to the brain, with nerve impulses travelling to specified terminals there, the location of which determined the modality (e.g. touch, auditory, taste) that was experienced. Muller, however, dealt with only the five classical senses, leaving the sense of touch to cover the entire spectrum of tactile experiences. It was

Max von Frey who around 1894 extended this model to include specific pain receptors (Melzack, 1973), along with three other sensory spots: touch, cold, and warmth. Free nerve endings branching out into the upper layers of the skin were cited as being responsible for transmitting "pain" to higher cortical centers. In addition, von Frey's theory held the "psychological assumption" that a given pain receptor led to a certain area in the brain, and resulted in a certain psychological experience. In other words, only that connection could cause pain, and activation of that connection was the only cause of pain.

Pattern theory was the next model of pain transmission to gain attention. Goldscheider was one of the first to propose that other factors such as stimulus intensity and central summation could influence one's perception of pain (Melzack, 1973). For Goldscheider, the particular patterns of nerve impulses that could cause pain were dependent upon the summation of skin stimulation at the dorsal horn cells in the spinal cord. Included in this proposal was a "critical level," past which a certain amount of nerve impulse activity will result in the pain sensation. Goldscheider cited two possible examples that could cause this occurrence: large amounts of pain stimulation relaying correspondingly large amounts of peripheral receptor stimulation, and large amounts of pain stimulation caused by self-reverberating neural circuits within the system which are not reflective of the lesser amount of peripheral stimulation. Other theorists have offered variations on this type of "pattern theory" formulation (Melzack, 1973). Simpler formulations rely on peripheral patterning (spatial and temporal) of skin receptors. The more sophisticated versions, however, also take into account the physiological specialization of receptors aspect of specificity theory.

Recent theorists have attempted to integrate these two positions, emphasizing more and more the roles of the spinal cord and the CNS in the whole pain process.

The gate control theory proposed by Melzack and Wall (1962), then, combines various elements of these different models of pain transmission and tries to synthesize their relevant aspects in order that they might explain many of the unusual facets of pain phenomena. As Melzack (1973) notes, "Recognition of receptor specialization for the transduction of particular kinds and ranges of cutaneous stimulation does not preclude acceptance of the concept that the information generated by skin receptors is coded in the form of patterns of nerve impulses. The law of adequate stimulus can be retained without also accepting a narrow, fixed relationship between receptor specialization and perceptual experience" (p. 149). They have, then, tried to account for the various contradictory aspects of pain in a comprehensive, unified theory.

Melzack and Wall's model, in its most basic form, posits a gating mechanism in the dorsal horns of the spinal cord that opens and closes to allow (or inhibit) pain impulses to the cortical centers, thereby modulating any direct connection between the receptors and the central processing site. The opening and closing of the "gate" depends primarily upon the relative activity in the large-diameter (A-beta) and small-diameter (A-delta and C) pain fibers that enter the dorsal horns from the skin sensory receptors. Melzack and Wall contend that the "physiological counterpart" to this "gate" is probably the substantia gelatinosa in the spinal cord. Higher cortical processes may also affect the gating mechanism via descending influences. The activity of the two types of pain fibers will, of course, depend upon stimulation at the receptor

sites in the skin. At this point, the transmission cells that send the messages on to the brain will be activated whenever their total stimulation exceeds a critical level. Large fibers inhibit transmission, while small fibers facilitate processing, i.e., open and close the gate. The larger the percentage of activated small fibers, the greater the likelihood of "pain" occurring. Large and small fibers tend to be set in motion by different types of stimulation. The smaller fibers appear to be in more or less continuous activity in a non-noxious state, hence keeping the gate in a predominantly "open" state. Abrupt stimulus change seems to increase the firing of the large fibers, which also have an ability to adapt readily. In the description of Melzack and Wall (Melzack, 1973), "if the stimulus intensity is increased, more receptor-fiber units are recruited, and the firing frequency of active units is increased. The resultant positive and negative effects of the large-fiber and small-fiber inputs tend to counteract each other, and the output of the T-cells rises slowly. If the stimulation is prolonged, the large fibers begin to adapt, producing a relative increase in small fiber activity" (p. 159). Hence, continued pain stimulation causes pain to rise non-linearly as time passes.

Signals controlling the position of the gate also descend from higher central nervous system processes. These include such subjective states as attentiveness, anticipation, and past experience. Efferent fibers from the brain may alter pain signal transmission via various systems; the reticular formation system, cortical projections, and a "central control trigger" mechanism have all been implicated as possibilities.

The implications of the gate control theory for the treatment of pain concern the malleability of the pain transmission system. Melzack and Wall's model is able to account for most of the seemingly contradictory nature of pain, while also allowing for feedback control mechanisms (some occurring presynaptically) and influences from various points along the system that can intercede to alter and modulate the occurrence of pain. Hence, factors such as attention, prior experience, anxiety, cultural learning factors, etc., can exhibit significant influences on the perception of pain.

There are, then, in this model, physiological mechanisms that serve the purposes that the three-component theory of pain of Melzack and Wall would endorse. The sensory skin receptors reflect the most sensory-discriminative part of the system, while descending influences from the higher cortical centers reflect the more cognitive-evaluative aspect of pain. The motivational-affective influences would stem from both spinal cord feedback loops and interceptions, and higher cortical functioning processes.

The acceptance of such a model for functional treatment purposes does not necessarily have as its corollary the acceptance of the model as "reality." Such "reality" may or may not ever be knowable. However, as the utilization of this and similar models for pain treatment purposes has yielded encouraging results (Meichenbaum & Turk, 1976), the true "reality" of the pain system becomes less important, and the development of useful concepts to deal with pain becomes more so. Given the acceptance of such a model, then, one can proceed to look at how such a three-component concept can be utilized to further our control of pain. And, when one begins looking at the research on methods of controlling pain,

the issue of pain measurement which can reflect changes in pain becomes relevant. It is necessary, therefore, that this issue first be addressed before proceeding on to potential methods of tempering and/or controlling pain. The following is a brief review of the various methods in pain measurement, along with conclusions as to which methods best suit treatment evaluation purposes.

Pain Measurement

The majority of the work done on pain measurement has utilized experimental pain rather than clinical pain. There are numerous reasons for this. Experimental pain has a fixed "stimulus," and is therefore available for exact quantification. It is also more predictable, in that one "causes" it, and hence is just generally easier to integrate into research paradigms. However, all experimental pain does not mimic clinical pain (Beecher, 1959), although some methods, such as the ischemic pain tourniquet method, may be more similar to it than others. Morphine, well known for its ability to ease many types of clinical pain, has little effect on most types of experimental pain. Obvious reasons for this difference include the fact that the experimental subjects know, overall, what to expect, e.g. that the duration of the pain will be limited, that no real harm will come to them because of the pain. In contrast, clinical pain is usually associated with potential or actual tissue damage, is essentially unpredictable, and has no guarantee regarding duration or prognosis.

The rudiments of pain measurement research are found in psychophysiologicaly oriented quantifications of thresholds, usually with

respect to certain fixed types of experimental pain. Hardy, Wolff, and Goodell (1952) did extensive work in this area. They utilized several different methods of inducing experimental pain, including pin pricking and heat radiation, and recorded various psychophysiological functions between objective pain-inducing stimuli and subjective estimates of pain. One postulated finding was the "Pain Intensity scale," where 0 equaled the first perception of pain, and the ceiling was anchored at the point where no additional pain could be distinguished. In between these two points, they measured 21 "just noticeable differences" (jnd's). For convenience, they equated two jnd's as a "dol"---their standard unit of objective pain between ceiling and threshold. Obviously, Hardy, Wolff, and Goodell saw differences among individuals and differences within individuals, across time, as being negligible. Pain thresholds, according to these researchers, are independent of age, sex, emotional stress and fatigue.

Merskey and Spear (1967a) have summarized the more common physical measures of pain, emphasizing the fact that pain research has been notoriously inconsistent in its usage of different pain parameters: the point where pain is first noticed subjectively (pain perception threshold, verbal report of pain), the point where pain is unbearable (severe pain threshold, pain reaction threshold, pain reaction point, severe reaction point), and the interval between the two (pain interval, pain duration, pain tolerance). There are also other parameters used by some studies not noted by Merskey and Spear, such as the point where the mere sensation of touch is first noticed.

Differences among the pain threshold, the pain tolerance level and the sensation perception threshold frequently occur. One possible

explanation for this has been offered by Gelfand (1964) and his associates (1963). In researching placebo effects on experimental pain tolerance and threshold, Gelfand found the pain tolerance of subjects receiving a "placebo pill" to increase following ingestion of the pill, compared to a decrease in the tolerance of the control subjects (no pill). Thresholds, on the other hand, decreased for both groups of subjects, just less significantly so for the experimental group. This finding led Gelfand et al. to conclude that tolerance levels do not necessarily correlate with threshold levels, and that tolerance levels may have more of a psychological component than threshold levels, with the threshold levels having more of a physiological component than the tolerance levels. In a follow-up study, Gelfand (1964) tested 24 nursing students on tolerance and threshold levels after an ultrasound pain procedure, using "permissive" instructions (e.g., "We aren't interested in how long you can stick the pain out. . . .") in contrast to "non-permissive" instructions (e.g., "Try to endure the pain for as long as possible."). Comparing his results with those of an earlier study (Clark & Bindra, 1956), he found that there were no differences in thresholds, but significant differences in tolerance levels, with the "permissive" group having lower levels. Correlations between the two measures were quite low. Thus, instructions were more influential on tolerance scores. Gelfand concluded that his earlier hypothesis was confirmed: "Pain tolerance probably has a greater psychological component and seems to be more amenable to experimental manipulation by means of psychological variables" (p. 41). A later study by Wolff and Horland (1967) somewhat tempered this conclusion when it addressed the issue of Gelfand's sole use of the ascending threshold, noting that

descending thresholds may have different properties. The authors, however, did interpret their overall results as providing support for the Gelfand hypothesis.

From this point, psychology progressed to verbal report measures of pain. K.D. Keele (1948) was one of the first to address this issue. He cited three causes of inaccuracy in verbal descriptions of pain: difficulty in finding words to describe an unusual if not unique event, confusion regarding relevant observations in the experience, and difficulties in remembering the experience. Keele, at the same time, introduced the "pain chart"--a graph of pain intensity by hours in the day. Anchor words represented the four points. "Slight" referred to awareness of pain without distress; "moderate," to pain distracting attention from routine acts; "severe," to pain filling consciousness to the exclusion of other events, and "agonizing," to pain causing motor effects, such as shock. Notable, too, was Keele's mention of the two elements of pain: that produced by the stimuli with no cognitive influence, and that which modified the pain. However, he did not attempt to separate these with his verbal measure.

Other researchers have utilized various self-report pain measures, many of which were founded in Keele's "Pain Chart." Clarke and Spear (1964) devised an analogue method for measuring pain: a 10-centimeter line with two verbal anchors of intensity at either end. A slash somewhere between the two anchors indicated the amount of pain felt. Woodforde and Merskey (1972) found this method to correlate with straight verbal descriptions of pain intensity, and concluded that "ordinary" verbal descriptions of pain are very important for ascertaining amount of subjective pain.

The "pain estimate" is a more recent measurement tool developed by Sternbach et al. (1974). Individuals are asked to rate their pain on a scale of 1 to 100, with 1 equaling no pain at all, and 100 signifying a level at which one would commit suicide if it had to be endured for more than a minute or two. Sternbach has also used the Pain Estimate (PE) clinically in conjunction with ischemic pain, against which patients can match their own pain. This "Tourniquet Pain Ratio" (TPR), according to Sternbach, removes some degree of subjective variability from the estimate, as the patient is given an objective criterion against which he can test his own reality. As Keele did, Sternbach noted that there are two components to pain, the sensation and the suffering. Unlike Keele, however, he postulated that his PE contained more of the latter, while the TPR reflected more of the "true" sensation. It can be, however, influenced by the same internal factors that have been shown to alter the more direct method of verbal report alone. The TPR possesses, too, the same drawbacks as do many of these other measures--it monitors only the intensity element of the pain experience, ignoring its other facets.

It appears, then, that both spontaneous verbal report and verbal report based on immediate physical stimuli have their problems. First, there are the basic difficulties that ensue when different measures of the same phenomenon do not correlate: One wonders if different aspects of the phenomenon are being measured with no recognition of this through the use of differentiating labels. In other words, all these measures purport to measure "pain." Such lack of specification can only create theoretical confusion. Secondly, the great majority of these measures are based upon research with experimentally induced pain. While there

is nothing inherently wrong with this, generalizing these results to clinical pain cannot be done without pronounced qualifications. This may not always be done.

Lastly, and perhaps most importantly, all of these measures view pain as possessing only one measurable attribute: intensity. This is certainly not true. Pain is a complex phenomenon and must be treated as such. This final issue is one of the central topics of the next section, which describes a measure called the McGill Pain questionnaire.

The McGill Pain Questionnaire

Until recently, almost all types of pain measurement followed the same tradition: Pain intensity was considered to be the only relevant aspect of the pain experience. However, as Melzack and Torgerson (1971) stated, "To describe pain solely in terms of intensity . . . is like specifying the visual world in terms of light flux only, without regard to pattern, color, texture and the many other dimensions of visual experience" (p. 50). They noted that the different qualities of pain may also be of diagnostic value, conveying pertinent information about the patient's pain. Towards the end, then, of broadening pain measurement research, Melzack and Torgerson compiled and categorized 102 words describing the pain experience; 44 were derived from an earlier list compiled by Dallenbach; the other were gleaned from various sources of pain literature. The final list was classified into 16 subclasses, based on qualitative differences among the types of sensations, i.e., whether they were movement sensations, temporal sensations, and so on. These subclasses were further categorized into three major classes: sensory

qualities, affective qualities, and evaluative qualities. It is noteworthy that these correspond to the three aspects of the pain experience hypothesized by Melzack and Wall. The sensory word list contained such words as darting, aching, numbing, cramping, and sharp. Affective words included exhausting, wretched, dreadful, and punishing. Finally, intolerable, annoying, mild, and miserable are examples from the evaluative word list.

Analyses conducted by Melzack and Torgerson indicated that 1) the organizational system for these words was appropriate, i.e., there was a high level of agreement among rankers' choices of words into the designated subclasses, and that 2) the various subclasses have definite intensity rankings that remain the same whether ranked by doctors, patients, or students. They concluded that their final list of pain descriptors was a concise, properly systematized collection, and suggested that it might form the basis for a pain measurement device able to tap all three areas of the pain experience. Such an instrument would be especially useful, they posited, in clinical settings where quality of pain may be an important consideration.

In 1975, Ronald Melzack presented the McGill Pain questionnaire (MPQ) as a follow-up to this work. The MPQ contained the listing of descriptor words in their final form of three major classes and 16 subclasses, with instructions for the patient to choose those that best describe his or her pain (one from each subclass) omitting any category that is not appropriate. In addition, relevant medical information, line drawings of the body for a spatial representation of the pain, words to describe the pain's temporal aspect, and overall indicators of "present" pain (PPI) are obtained. This PPI is a number from 1 to 5,

anchored by the words mild, discomfoting, distressing, horrible, and excruciating, all chosen from the evaluative list of Melzack and Torgerson.

The MPQ was given to 297 pain patients, with widely varying diagnoses, ranging from arthritis to cancer to menstrual pain. Several types of data were computed from the questionnaire. Number of words chosen (NWC), rank values of the verbal descriptors PRI(R), scale values of the verbal descriptors PRI(S), and the PPI were all compiled. Statistical analyses revealed various significant correlations: PRI(S) with PRI(R); NWC with PRI(S) and PRI(R); and PPI with NWC and PRI(R). The PRI(S) was later abandoned in favor of the superior PRI(R) measure. An additional analysis of the change scores for 29 patients undergoing treatment for their pain was performed, and this indicated that the change scores for these various statistics were consistent over administrations.

The data from ten patients were also analyzed to determine the consistency of the classes selections over two administrations. The percentage of agreement varied between 50-100%, with a mean agreement percent of 70.3. The authors did not believe that this reflected memory recall, as patients were apparently quite selective in their choices, pondering each subclass list carefully before making a decision. Consistency correlations for individual patient syndromes were slightly higher than that for the combined data of all syndromes. Some differences were noted among syndromes regarding subclasses of descriptors chosen, even with the underestimation bias produced by drug usage among some of the patients.

Finally, the MPQ was used in a treatment study to determine its possible value in analyzing the effectiveness of different pain relief

techniques. Specifically, alpha-feedback training, hypnotic training, and a combination of both techniques were examined over three administrations of the MPQ: baseline, training, and practice. Results indicated that the MPQ was able to effectively discriminate the relative value of the three treatment procedures for the three components of the pain experience by reflecting differential efficacy among the three pain components of the different treatment packages.

Melzack concluded that the MPQ is a "useful tool for examining the dimensions of pain (1975, p. 294). He cited three areas of utility: 1) providing pain data, other than intensity data, that can be quantified; 2) providing information regarding different methods' efficacy in relieving pain; and 3) providing information regarding a given treatment's effect on the three different components of pain: sensory, affective, and evaluative.

Closely following this presentation of the MPQ, Melzack utilized his instrument in several studies, one examining pain change via a drug mixture treatment (Melzack, Ofiesh, & Mount, 1976), one addressing the issue of pain in psychotic patients (Veilleux & Melzack, 1976), and one more directly related to testing psychometric properties of the MPQ by analyzing by discriminant functions the constellations of descriptor words in eight different pain syndromes. In the first of these, Melzack et al. administered the MPQ to 149 terminally ill cancer patients receiving the Brompton mixture (a cancer treatment drug) and a phenothiazine for pain treatment in three different hospital settings: a palliative care unit (PCU), a general hospital ward, and a private room environment. The treatment controlled pain for all patients, but a larger percentage were helped in the PCU. All three dimensions of the MPQ were

lowered. However, no individual analyses for significant change were reported for each pain dimension. Nonetheless, Melzack et al. concluded that "the Brompton mixture clearly produced low scores in all three dimensions of pain--sensory, affective and evaluative" (1976, p. 127).

Pain in psychotic patients (Veilleux & Melzack, 1976) was looked at using the MPQ in a study with 27 hospitalized psychotic patients, 15 of whom complained of pain during a pre-session interview. The MPQ data showed that all patients reported pain in the "affective" area to a greater extent than general medical patients did in a previous experiment. This difference did not extend to psychotic patients who reported pain versus those who did not. An additional finding was that more "sensory" words were used by those complaining of pain. These findings were explained by the authors in terms of gate control theory. It was also postulated that the high "affective" scores would recommend a psychotherapeutic approach, as opposed to a pharmacological one, in treating psychotic pain, demonstrating one way that the MPQ dimensions could be useful in indicating appropriate treatment areas for certain types of pain.

Lastly, the MPQ was administered to 95 patients suffering from eight different pain syndromes: menstrual pain, arthritis, labor pain, toothache, carcinoma, phantom limb pain, neuralgia, and degenerative disease (Dubuisson & Melzack, 1976). A multiple group discriminant analysis was performed on their scores yielding results that indicated that "each type of pain [occupied] a different region in the multi-dimensional space" (p. 480) of the pain words. Differences were statistically significant. A post-analysis diagnostic classification was then run on these constellations, and the correct diagnosis was chosen in 77%

of the cases. Dubuisson and Melzack concluded, then, that the MPQ has definite potential as a diagnostic tool.

Left untested, however, was the rationally based selection of the pain words used in the MPQ into the different classes. Even though secondary classification had been basically confirmatory of Melzack and Torgerson's original classes, no empirical demonstration of these classes' validity had been done. In 1977, Crockett, Prkachin, and Craig did address these assumptions. Eighty-five low back pain patients and 129 volunteers were administered the MPQ. The volunteers were undergoing an experimental (electric shock) pain experience. The results were factor analyzed, and 5 factors emerged from the data. Factor I was labeled an "Immediate Anxiety" factor, and it contained loadings from three affective descriptors and two sensory ones. Factor II was primarily affective in nature, and seemed to reflect "perception of harm." Sensory and evaluative adjectives constituted Factor III, and it was labeled a "somesthetic pressure" factor; similar loadings appeared on Factor V, a "cutaneous sensitivity" dimension. Finally, only sensory descriptors emerged in the fifth factor; hence, it was hypothesized that this factor reflected pure sensory information. Crockett et al. interpreted these findings as providing weak support for Melzack and Wall's three component classification system, as certain clusters did seem to adhere to approximations of their categories, although there was not an exact "fit."

Leavitt, Garron, Whisler, and Sheinkop (1978) also looked at the MPQ categories from an empirical standpoint. One-hundred and thirty-five back pain patients were given the word list from the MPQ (this time the words were in random order) and asked to describe their typical pain.

A principle component analysis was performed on their responses, and seven interpretable factors were extracted. The first was labeled "emotional discomfort" and loaded primarily from the affective word list. Factor II contained words from all three of Melzack's categories and seemed to reflect a "mild pressure sensation." The last five factors were all composed of purely sensory words. The authors interpreted these results, as had Crockett et al., as providing evidence for the existence of Melzack's three factors, although certainly not a definitive confirmation. The patterns did appear to cluster into groups approaching sensory and affective classes, with the evaluative class being less strongly represented. This is not surprising, however, in that there are far fewer words in the evaluative category than in the other two. Thus, the overall conclusion seemed to be that the empirical analysis "(provided) some support for the Melzack-Torgerson general taxonomy of pain" (p. 280).

Other work on the utility of the MPQ has focused on different areas. Diagnostic potential concerning descriptors consistently chosen by specific pain groups has been investigated with varying results. Patients with pain of organic etiology appear to use sensory-thermal descriptors more often than do patients with pain of psychiatric origin (Agnew & Merskey, 1976). Different samples of cancer patients have been observed to select quite similar groups of pain descriptors (Graham, Bond, Gerkovich, & Cook, 1980), although other samples of patients with various diagnoses have chosen somewhat different groups of words (Dubuisson & Melzack, 1976). The MPQ word list, in relation to the dimension of pain intensity, has also been researched (Bailey & Davidson, 1976), with results pointing to the affective-evaluative words as being more

reflective of the intensity continuum. One study assessed the reliability and consistency of the MPQ classes over administrations. Graham et al. (1980) used 18 cancer outpatients and found that MPQ indices (PRI and PPI) were "highly replicable" over the two administrations, with the affective and sensory scores not differing significantly from Melzack's sample. In a second phase within this study, subjects receiving four administrations of the MPQ exhibited mean consistency percentages ranging from 66 to 80.4. Two final findings emerged from this study: It appears that the written form of the MPQ is as effective as the oral form originally suggested by Melzack in reflecting weekly pain levels rated separately and then correlated with the MPQ data. These correlation statistics suggested that the MPQ is best used as an immediate measure of pain, rather than a summary of past (weekly) pain.

It appears that research surrounding the MPQ's value as a pain measurement tool has been basically positive, with some qualifications. Its usefulness as a diagnostic aid is still an empirical issue. Its reliability and consistency seem to have been fairly well established, although much of this work has been done by Melzack and his associates. The validity of its class categories, which is the most pertinent area to this study, is--for the most part--supported, although the evidence has not been unequivocal.

Pain control research, then, does have a pain measurement device that enables one to monitor changes in all three theoretical dimensions of pain. The literature in this field, however, reveals that until quite recently, research in this area has ignored even the very basic theoretical positions on the multi-component structure of pain. Strategies have been tested using physiological responses (EMG, heart rate,

respiration rate, etc.), tolerance and threshold reports, or ultra simple verbal report measures of pain that usually only yield results of pain intensity as a dependent variable. These are useful, as far as they go. However, if one accepts and recognizes the currently accepted methodological model of pain of Melzack, it seems appropriate that one would utilize this concept in monitoring the efficacy of the various techniques aimed at controlling pain. Such a movement has come about, as previously mentioned, only within the past few years. The following is a brief summary of the history of the methods used in attempting to control pain, and the movement toward a more comprehensive system of viewing pain.

Pain Control

In a review of the broad range of methods aimed at alleviating pain, Meichenbaum (1977) classified the various "physical" techniques into three categories: 1) using pharmacological agents directed toward receptors, the dorsal horn of the spinal cord, or higher levels of the central nervous system; 2) injecting school or local anesthetics into nerve roots to "block" the pain; and 3) performing surgical procedures at various sites along the pathway between the peripheral skin receptors and the cortex. All three, he noted, are only minimally effective in reducing pain over any long-term period of time. Recognizing this, Melzack and Casey (1968) offered the following advice: "The surgical and pharmacological attacks on pain might well profit by redirecting thinking toward the neglected and almost forgotten contribution of motivational and cognitive processes. Pain can be treated not only by trying to cut down sensory input by anesthetic blocks, surgical intervention

and the like, but also by influencing the motivational-affective and cognitive factors as well" (p. 435).

Imagery Approaches

This suggestion was heeded by researchers with a variety of different approaches to controlling pain. The Chaves and Barber (1974) study was one of the first to take the approach of using "imaginative inattention," in Meichenbaum's terminology, as a pain control device. They compared groups of subjects undergoing experimental pain via a finger pressure algometer: One group was told to imagine their finger as being insensitive and one was told to imagine a pleasant scene. Both groups reduced their verbal pain report (on a 10 point scale) significantly more than a control group and a group merely expecting pain reduction.

Horan and Dellinger (1974) and Horan, Layng, and Pursell (1976) both investigated the use of "in vivo" emotive imagery to temper the subjective pain experience. In the earlier project, 36 college students were asked to immerse their hand in ice water (0 degree centigrade) for as long as possible. They were then instructed to either count backwards from 1,000 (distraction) or to imagine a scene of lush meadows, blue lakes, etc., intended to evoke feelings of relaxation. There was also a no treatment control group. Results indicated that the emotive imagery group could tolerate the pain three times as long as the control group, and twice as long as the distraction group. The latter study utilized the same type of imaginal instructions on a 3-minute tape played to one group of 27 women, aged 18-40, undergoing routine tooth

prophylaxis in a private dental practice. A second group received a 3-minute tape reading numbers off of an imaginary white background, and a third group listened to three minutes of silence. Dependent variables were heart rate and self-reported discomfort. There were no significant differences between groups for heart rate, but there were for self-report of pain, with the emotive imagery group faring the best. Noteworthy in this second study is its use of clinical pain, although the "perception of harm" element noted by Beecher was minimal.

Finally, in 1978, Worthington researched the effects of imagery content (pleasant versus neutral scenes), choice of imagery content (choice versus yoked), and self-verbalization (pre-planned coping statements versus none) on self-report of pain on a 100 point scale and pain tolerance during a cold pressor test. Ninety undergraduates were used as subjects. Analyses revealed differences on tolerance and self-report measures, with the former being increased more by the choice of imagery factor (choice greater than yoked) and the self-verbalization (SV) factor (SV greater than none), and the latter being decreased significantly only in the choice condition.

A second class of strategies investigated has been those falling under the heading of "imaginative transformations." These include hypnotic or waking cognitive reinterpretation of the painful stimuli as something other than pain, and minimization of the painful stimuli as lessened or trivial. Barber and Hahn (1962) tested 49 subjects undergoing experimental pain (cold pressor test) on the dependent variables of heart rate, respiration rate, frontalis muscle action potentials, skin resistance, and a 5 point scale of subjective rating of pain. Four groups were formed: those receiving hypnotically produced "analgesia"

instructions and ice water in the task, those receiving waking-produced "analgesia" instructions and ice water in the task, those receiving no instructions and ice water in the task, and those receiving no instructions and room temperature water in the task. Results showed that for both the physiological variables and the pain self-reports, hypnotic and waking-produced analgesia subjects were significantly lower than the no instruction group with ice water in the task.

Neufeld (1970) used a radiant heat method to induce pain in 12 female undergraduates, and divided them into three groups: those told to reinterpret pain as pleasurable (i.e., deny the pain), those told to think of the pain as a protective sensory reaction, and those told to think of a blank wall. "Denial" instructions proved to be significantly superior to the other two in raising pain tolerance, the only dependent variable used in the study. Five high school students trained in hypnotic relaxation were monitored by Sachs (1970) on blood pressure and a subjective pain rating on a 5 point scale during a cold pressor pain test. Contradictory results emerged, with subjective reports being lower in hypnotic analgesic conditions, but with no comparable findings in the blood pressure data. Scott and Barber (1977) used 80 college students as subjects within four different treatment groups under instructions to either interpret algometer pressure or cold pressor pain as non-painful (two versions: an elaborate description and a similar, but condensed description) or to imagine pleasant events. A control group was also run. Dependent variables were subject's pain rating and pain tolerance time, none of which were significantly changed by any of the strategies. In an extension of this work, Scott and Leonard (1978) added covert reinforcement to the reinterpretation strategy (imagination

of a pleasant event) and compared it to groups receiving reinterpretation instructions only, expectations for pain reduction only, or no instructions. Subjects were 28 male and 28 female undergraduates. The experimental pain was produced via the cold pressor test. The dependent variable was the pain threshold. Significant differences were found between the covert reinforcement group and the reinterpretation and expectancy groups with the former being superior in raising pain thresholds, with all groups raising threshold levels above that of the controls.

Blitz and Dinnerstein (1968) and Jaremko (1978) both attempted to utilize subjects' ability to "transform the context" of the pain experience to aid them in altering the severity of the pain. The former study gave three different sets of instructions to 24 male volunteers undergoing electric shock-induced pain, with threshold as the primary dependent variable. The instructions were to either redefine the threshold, i.e., make sure it is really pain, or to imagine themselves being paid money for enduring more pain. Results indicated that subjects told to redefine threshold significantly elevated their threshold over the "paid" group and a control group. Jaremko's study used rationalization as its main "contextual" change strategy. Subjects (70 college students) were told to think about the course credit they would be receiving for their participation to enable them to withstand the pain of a cold pressor test longer. Two other groups were given instructions to imagine a classroom setting (distraction) or a desert on a hot day (reversal of affect), with the cold water being refreshing rather than painful. The four dependent variables were a pain rating on a 4 point scale, an anxiety questionnaire (STAI), the electromyogram reading on the forearm

extensor, and pain tolerance time. Only the pain ratings and tolerance times indicated pre- to post-test changes. All three experimental groups were effective in significantly increasing pain tolerance, with the reversal of affect group being most effective, followed by rationalization, and then the distraction strategy.

Non-Imagery Approaches

Somatization, the focusing on bodily processes or sensations antithetical to the perception of pain, has also been pursued as a possible tool in mediating the pain experience. Bobey and Davidson (1970) postulated that the experience of anxiety would act in an antagonistic way to the experience of pain, somewhat akin to the logic behind Wolpe's Reciprocal Inhibition technique. Hence, it would have substantial potential as a pain control strategy. Eighty student nurses received one of four training procedures. Instructional tapes were made for the four conditions. One consisted of relaxation techniques adapted from the systematic desensitization paradigm, one (cognitive rehearsal) involving descriptions of the two pain stimulators used (radiant heat apparatus and pressure algometer), one (anxiety) was a recording of women crying and screaming during the latter stages of childbirth, and one (control) was a tape designed to be boring on good study habits. Results indicated that relaxation, anxiety, and cognitive rehearsal were all effective strategies for helping subjects increase pain tolerance, with the relaxation having the greatest effect. Westcott and Horan (unpublished) also attempted to utilize another aversive event (anger) to temper the pain experience. Forty male and 40 female subjects were placed on one

of four treatment conditions: neutral (imagine two-digit numbers), anger (imagine an argument with your professor), relaxation, and control. They all underwent the pain of a cold pressor task. No significant differences were found for the male subjects. However, for the female subjects, the anger condition produced tolerance four times as great as the control condition. Relaxation and neutral conditions each produced tolerance levels $2\frac{1}{2}$ times that of the control group.

The following four studies serve to represent the use of external distraction in pain control research. Mefferd and Wieland (1965) offered subjects (3 male graduate students) a word association task to divert their attention from the pain of a cold pressor task. Dependent variables were basal skin resistance, galvanic skin resistance, electrocardiogram readings, and skin temperatures. The experiment continued over 120 consecutive days. Results showed that as soon as the word association task was "superimposed" on the pain task, the four "stress" responses decreased. Kanfer and Goldfoot (1966) used 60 female undergraduates as subjects in an experiment testing differences among five pain strategies in increasing pain tolerance and lowering pain rating scores on an 8 point scale. Groups were told to either 1) expect severe pain, 2) verbally describe all sensations while in pain, 3) watch a clock and set internal goals and/or limits for themselves, or 4) describe a slide they were shown during the experiment. The control group was told nothing. Significant differences emerged between groups told to verbalize their pain, to do nothing (controls), to expect pain, to watch the clock, and to describe the slide, in order from low-to-high tolerance. The authors concluded that external distraction devices are the most effective ones for their purposes.

Somewhat different distraction devices were employed by Barber and Cooper (1972). They had subjects either listen to a tape of the life story of a "mysterious actress," count 1, 2, 3, and 4 aloud for two minutes, or add multiples of seven. "Pain change" was defined by subjective ratings on a 10 point scale. There were no significant differences, but trends did appear for the "story" and "adding" groups to be superior to the control group in lowering pain scores. Finally, Kanfer and Seidner (1973) focused on the aspect of subject control over distraction technique in an experiment in which the only procedural difference between the two experimental groups was that one could initiate change of distraction slide and one could not (i.e., the experimenter progressed the slides). All groups differed from each other; the subject-initiated change group tolerated a cold pressor task longer than did the experimenter-initiated change group, which, in turn, tolerated pain longer than the no distraction control group.

One final approach that has been researched involves teaching subjects controlled breathing and/or muscle relaxation techniques to offset the pain in a given pain procedure. This type of endeavor is best exemplified by the previously mentioned study conducted by Bobey and Davidson (1970). Their "relaxation" procedure was one adapted from Wolpe's systematic desensitization techniques as used by Lazarus and Abramovits. The rationale for using this method, as with regard to anger, is that relaxation and pain are antagonistic responses, and that by producing one (the relaxation response), one minimizes the other (the pain response). As noted earlier, the relaxation tape proved to be the best overall technique for increasing pain tolerance on pressure algometer and radiant heat pain.

Thus, it is evident that a myriad of different techniques have been investigated in hopes of finding ways of alleviating various types of pain. As it was noted earlier, however, only within the past two or three years have these studies been designed with an awareness of the multi-component models of pain that have been currently accepted as possessing at least functional value. A recognition of these theoretically and empirically based concepts does now seem to be occurring, and at least two different approaches have emerged in the literature testifying to these design changes.

One of these approaches has been in the somewhat separate area of the effects of expectations and accurate sensory information on pain tolerance. Most of this work has been done by Jean E. Johnson and her associates, and is especially noteworthy in that it has often employed clinical pain in its designs, e.g. surgery patients. The model utilized by this group is the earlier one of Beecher: two-component theory of pain (sensory and reactive). Similarities to the Melzack and Wall model utilized by the present study, however, are not difficult to see.

In one of her first projects, Johnson (1973) asked 20 male college students to rate the sensory and distress (i.e., reaction) components of their ischemic pain on two measures: a 5 point scale with anchor words to record the sensation component, and a numbered thermometer-style scale for rating distress intensity. Relevant and irrelevant pre-pain information about the pain inducing procedures had no effect on the sensation component, but relevant information did lessen distress scores for subjects. Most pertinent to this study is the fact that the two components were recognized and measured separately.

Johnson and Levanthal (1974) studied 48 patients undergoing an average endoscopy procedure to see if differences could be found between groups given two different preparatory messages aimed at either reducing emotional distress or enhancing behaviors to reduce danger and pain during the procedure. Results were somewhat equivocal, with some data indicating an antagonistic relationship between the two systems (behavioral and emotional). This design, although not precisely utilizing the two-component theory of Beecher as the previous study did, does posit different elements in the pain response, hence endorsing the bi-component concept's usefulness in dissecting the experience of pain. It also demonstrates the possibilities of using a clinical population in pain and stress research. Likewise, a clinical study by Fuller, Endress, and Johnson (1978) examining the effects of relaxation and sensory information on pain during a pelvic examination demonstrated the potential of using clinical pain patients in attacking the problem of pain control.

One other study by the Johnson group has also demonstrated the utility of these concepts. Johnson and Rice (1974) tested 52 male subjects undergoing ischemic arm pain, measuring the same two aspects of pain: sensory and distress elements with the same devices as the 1973 study used. Four different groups were formed: those hearing a tape describing sensations irrelevant to their pain, those hearing a tape describing two of the sensations that would occur with their pain, those hearing a tape of all the sensations that would occur with their pain, and those hearing no description of their pain. Analyses indicated that both groups receiving a description (groups 2 and 3) of their pain had lower distress ratings than the two other conditions, whereas the

differences in sensation ratings were only of borderline significance. A series of research studies have been done, then, illustrating some utility to the use of a multi-component aspect of pain, in this case, Beecher's two-component model.

A second, more extensive series that encompasses Melzack and Wall's three-component theory of pain has been begun in the framework of Meichenbaum's "Stress Inoculation" work. Meichenbaum (1977) has developed a set of techniques that, he posits, serve to inoculate a person against overly extreme reactions to different kinds of aversive reactions, such as anxiety, anger, and--most relevant to this study's purposes--pain. Meichenbaum cites Turk's (1975) unpublished research in the area as representative of how one could apply his program to the pain control area. His program is a three-stage process. First, subjects are given the "educational" component: a simplified version of Melzack and Wall's gate control theory emphasizing the separate "components" of pain as distinct, even though Melzack had acknowledged that they interact in various complex ways. Following an opportunity for discussion of the theory, subjects are given an explanation of how different coping techniques can be aimed at different components.

The sensory-discriminative component is conceptualized as being amenable to such strategies as physical and mental relaxation and attending to slow, regular breathing, given that such devices can break the cycle of muscle tension-anxiety-more muscle tension and hence, pain. Melzack's motivational-affective dimension is envisioned as being responsive to such techniques as attention-diversion, somatization, and imagery manipulations, in that they curb the feelings of helplessness and lack of control that contribute to the experience of pain. Finally, the

viewing of the painful experience as a series of stages to get through--a form of intellectualization--is postulated as being the best coping device to handle the cognitive-evaluative aspect of pain. Subjects are encouraged to prepare for the stressor, to confront and handle the pain, to cope with feelings at critical moments, and to apply reinforcement for having coped. Subjects are then allowed to choose "cafeteria style" which strategies they would like to use if involved in painful situations.

The third stage of stress-inoculation involves practice, either via role-playing and imagery-rehearsal, as in the unpublished 1975 Turk study, or actual practice with a cold pressor test, as in a later project by Meichenbaum and Turk (1976). It was found that subjects were able to increase their pain tolerance on an ischemic pain test by fifteen minutes from pre-training to post-training. Hence, Meichenbaum's stress inoculation procedure appears to have substantial potential in mediating a painful experience.

Horan, Hackett, Buchanan, Stone, and Demchik-Stone (1977) began a component analysis on this inoculation package, and concluded that the educational component alone was of no benefit at all, and the training component was only effective under certain conditions. The practice component also had no significant effect on pain tolerance or self-report of pain. Hackett, Horan, Buchanan, and Zumoff (1979) analyzed the relationship between the extent (number of trials) of the exposure/practice component and tolerance. A curvilinear function was found, leading the authors to conclude that excessive exposure may actually sensitize subjects to the pain. Both of these studies utilized non-clinical populations, with the former using graduate students and undergraduates in the human services area, and the latter using 123 undergraduate females in the human services area.

Hackett and Horan (1980) have conducted the most recent investigation into this area, with a $2 \times 2 \times 2$ analysis of the coping skills/training segment of the entire package, given that the lack of efficacy of the other two elements (education and exposure) had already been established. Hackett and Horan hypothesized that the 123 undergraduates exposed to the three different skill areas--sensory-discriminative training (SD), operationalized as taped relaxation skills training; motivational-affective training (MA), defined as taped instructions in distraction, somatization, imaginative transformations or "in vivo" emotive imagery designed to block anxiety-generating images; and cognitive-evaluative training (CE), consisting of taped instructions in Meichenbaum's 1977 self-training in coping statements organized within a four stage framework of 1) preparing for the painful stressor, 2) confronting and handling the painful stressor, 3) dealing with feelings at critical moments, and 4) self-reinforcement for handling the stressor, would all do better on a cold pressor test than subjects receiving no treatment on the three dependent variables of pain tolerance, pain threshold, and self-reported discomfort (9 point scale). Subjects were assigned to nine treatment cells, with all possible combinations of treatments (SD, MA, CE, SD+MA, SD+CE, MA+CE, SD+MA+CE) forming seven of the cells, with the remaining two being a no treatment control group and a group receiving only the educational and exposure components of the stress inoculation procedure. Analyses of variance on the data revealed the following results: 1) SD training positively influenced tolerance, but not threshold or discomfort; 2) MA training produced a significant main effect on threshold, along with a complex interaction effect with CE; however, no main effects were found for the tolerance or self-rated

discomfort variables; and 3) CE training had no significant main effect on any dependent variable. Checks on experimenter demand effects showed no influence.

There were other results, however, that were somewhat puzzling. For one thing, CE training actually diminished the effectiveness of the MA training on the dependent variable of pain threshold. Secondly, whereas the SD training had significant main effects only on tolerance levels, the MA training affected only thresholds. This finding is incongruent with previously mentioned theoretical and empirical positions (Gelfand, 1964; Gelfand, Ullman, & Krasner, 1963) positing a higher physiological/sensory loading on threshold levels, and a larger psychological loading on tolerance levels. If one accepts this as true, it would be expected that MA training--as a more psychologically directed strategy--would have more influence on tolerance, and that SD training, being more physiologically oriented, would affect threshold levels to a greater extent. Exactly the reverse occurred in the Hackett and Horan study.

Given these incongruous findings, it would seem necessary to take a closer look at what is and what is not happening in the pain inoculation procedure, and what could be improved to enhance the validity of these and similar conclusions. Firstly, Meichenbaum (1976) originally assigned certain coping strategies to each component condition (i.e., relaxation training to the SD category) on a purely rational basis. There has been no empirical evidence guaranteeing that his chosen skills were actually reaching and/or affecting the "intended" component. Dependent variables have always been tolerance levels, threshold levels, or intensity rating scales. An obvious solution to this quandry is to measure post-treatment

pain change by means of the MPQ, a device specifically designed to assess change in the specific areas in which these strategies have been aimed. This, then, could provide an empirical check on which kind of treatment was affecting which component of the pain experience. For example, if the SD/relaxation training is truly reaching the sensory component of pain, any change should be reflected primarily in the sensory-discriminative words of the MPQ. Similar assessments needed to be made in the other two areas of pain control, motivational-affective and cognitive-evaluative.

A second area that needed to be altered within the Meichenbaum paradigm is the use/non-use of clinical pain as opposed to experimental pain. As this review has previously noted (Beecher, 1959), clinical pain is substantially different in nature from experimental pain. Generalization from one to the other cannot be assumed. It would behoove researchers, then, to examine the effects of these different pain coping techniques in a clinical population. Such an endeavor was undertaken by this study. It was largely investigative at this point. One possible alteration would be greater effectiveness for the MA strategies, given the postulation that clinical pain contains a larger "amount" of the psychological component than does experimental pain.

The present study, then, was designed with two intentions. These were to 1) provide a check on the assumption that the three types of strategies utilized by Meichenbaum in his stress inoculation procedure produce effects on the specific component of pain at which they are aimed. This would be accomplished through the administration of the MPQ, which has been shown to monitor changes in these three spheres and to 2) investigate the effects of transferring Meichenbaum's training

strategies to a clinical pain population, specifically chronic outpatient arthritis patients.

The strategies used were training tapes of either relaxation (SD), emotive-imagery (MA), or cognitive preparation (CE). It was hypothesized that 1) subjects who listened to the relaxation tape would lower their sensory-discriminative scores more than the subjects in the other three groups, 2) subjects who listened to the emotive-imagery tape would lower their motivational-affective scores more than the subjects in the other three groups, 3) subjects who listened to the cognitive-evaluative tape would lower their cognitive scores more than the subjects in the other three groups, and 4) all three treatment groups would lower their PPI scores more than the no treatment control group. Also of interest was the possible occurrence of overall differences among the scores on the four dependent measures.

CHAPTER TWO

METHOD

Subjects

Forty rheumatoid and osteoarthritis patients (median age = 57.5, range 24-74) were recruited from the Shands Hospital arthritis clinic, the Shands Hospital orthopedic clinic, and a private practice arthritis clinic, with the approval of the attending physicians. The subject pool was composed of 26 females and 14 males. Potential subjects were approached prior to their medical appointment as they waited in the clinic patient rooms. A brief explanation of the experiment was given, and the patients were asked if they were experiencing any pain at the current time. Those patients not experiencing current pain were excluded from the subject pool, as the MPQ is best used as a measure of immediate pain experience. Those subjects expressing interest in participation in the study were then read the informed consent description (Appendix A) of the requirements of the study, and those agreeing to become a subject were given the informed consent forms to sign. They were also asked to complete a questionnaire concerning their current drug regimen along with a self-report rating on the overall severity of their illness (Appendix B).

Treatments

Subjects were randomly assigned to one of the four following groups: relaxation training (sensory-discriminative group), emotive-imagery training (motivational-affective group), cognitive preparation training (cognitive-evaluative group), or a no treatment control group (ten subjects in each group). Mean ages for these groups were 48.6, 48.9, 54.8, and 60.6, respectively. These means did not significantly differ. The relaxation and emotive-imagery groups each contained seven females and three males; the cognitive preparation and no treatment groups each contained six females and four males. Treatments for each experimental group differed only with respect to the content of the training tape. Transcripts of these tapes appear in Appendix C. The relaxation training tape follows the style of Jacobson (1938), with instructions in the use of deep muscle relaxation with an emphasis on the role of slow, rhythmic breathing. The emotive-imagery training tape uses scenes similar to those used by Mealiea (1967), and describes images designed to elicit feelings of tranquility and relaxation, while also serving as a mental distraction. The cognitive preparation training tape utilizes the instructional format of Meichenbaum and Turk (1976), and focuses on skills designed to help the coping process when confronted with a stressor such as pain. This strategy also includes the use of self-statements directed at reinforcing the person for dealing appropriately with the pain experience. The no treatment control group heard no tape. The pre- and post-training measurements were administered at comparable time intervals to the experimental groups. The tapes included a brief introduction designed to equalize any differential "suggestibility" effects of the tapes.

Procedure

The experiment was conducted by the author and a research assistant. Following the signing of their consent forms, subjects were taken to a private room and were asked to complete the pre-training MPQ and the PPI. These two measures have been published by Melzack (1975). They next listened to either the appropriate training tape (all approximately thirty minutes in length), or waited for the same amount of time in the room (control subjects). Subjects then completed the post-training MPQ and PPI, along with the additional requested measures: 1) rating the utility of the specific pain strategy suggested, 2) rating the credibility of the specific pain strategy suggested, 3) listing their own typical coping strategies, 4) indicating the pain sites on the body, and 5) reporting what strategies were actually used (Appendix D).

One week later, a follow-up questionnaire was mailed to the subjects. This questionnaire included the same MPQ and PPI as the pre- and post-training testing. This was for purely exploratory purposes, as the aim of this study was to examine the effects of different coping strategies on the patient's experience of immediate pain, and not any long term treatment results. Upon receipt of this follow-up questionnaire, a detailed explanation of the study and its purposes was mailed to the subjects. Twenty-five subjects responded to the first request. Initially, second requests were mailed to all subjects not responding within two weeks' time. This procedure was altered when it became apparent that subjects were extremely variable in their response time, making it equally practical to wait for responses with no pre-determined deadline. Thus, four subjects received second requests for their questionnaires, three of whom responded.

Dependent Variables

The two main dependent variables were the pain adjective rating scales from the McGill Pain Questionnaire, and the Present Pain Index (PPI) from the same instrument. The pain adjective rating scale provides four different scores: sensory-discriminative rank score, motivational-affective rank score, cognitive-evaluative rank score, and miscellaneous rank score. There is also a total rank score that can be calculated. These scores are computed by totaling the ranks of each word checked within each of the subclasses, with 1 being the least intense word describing the pain experience focused on by the different grouping of pain adjectives, and 3, 4, or 5 (depending on the number of words in each subclass) being the most intense.

The total rank score is equal to the summed ranks of the adjectives in all subclasses of adjectives. The Present Pain Index is a single quantitative assessment (1-5) of the current level of pain that the patient is experiencing.

The additional measures that were obtained include the following:

- 1) a quantitative (1-5) rating of the utility of the pain strategy to which the given subject listened, 2) a quantitative (1-5) rating of the credibility of the treatment, obtained via the question, "How would you rate the degree to which you 'believed in' the treatment tape and how much it would help you?" 3) an indication of the body sites of the pain (Appendix E), obtained from designations on a human figure drawing; this was a qualitative measure, 4) a report of subjects' typical coping strategy used when in pain, and 5) a report as to what coping strategies were actually being used as the client completed the MPQ scales and the PPI.

CHAPTER THREE

RESULTS

Primary Analyses

Pain ratings for the pre-test total scores (mean = 26.5, range = 51.7) showed this rheumatoid- and osteoarthritic population to be comparable to the ones initially described by Melzack (1975) as suffering from cancer pain (mean = 26), phantom limb pain (mean = 25), and post-herpetic pain (mean = 22.6). An analysis of variance (ANOVA) procedure was applied on each of the four main dependent variables to test for the effects of treatment, time, and treatment x time. Time was defined as pre-scores minus post-scores. A significant effect for time was found for the variables S1, S3, and S4 at the .0001, .0001, and .04 levels of significance, respectively (Tables 1-4). The time effect only approached significance for the variable S2 (.08). A Dunnett's t-statistic was calculated for each treatment group/control comparison to check for a significant effect for each treatment group compared to the control group. None of these comparisons were significant at the .05 level. Differential treatment effects also failed to reach significance when pre-treatment variability was partialled out in a General Linear models procedure. A test for significance of correlation between severity scores (1-5 scale) and treatment effect found no significant relationship. Therefore, it was not necessary that the effect be partialled out. Thus, three of the dependent measures (sensory scores,

Table 1

Analysis of variance table for the variable S1 (sensory score)

Source	df	Sum of Squares	Mean Square	F
Model (Trt x Time x Trt x Time)	43	4345.4375	101.056	5.01*
Error	36	726.0500	20.168	
Time	1	437.1125		21.67*
Trt x Time	3	49.3375		0.82
Tests of hypotheses using the ANOVA Mean Square of Subj (Trt)				
Trt	3	38.7375		0.12

Note. Trt = Treatment

* $p \leq .0001$

Table 2

Analysis of variance table for the variable S2 (affective score)

Source	df	Sum of Squares	Mean Square	F
Model (Trt x Time x Trt x Time)	43	327.4375	7.6148	3.08*
Error	36	88.9500	2.4708	
Time	1	7.8125		3.16**
Trt x Time	3	5.7375		0.77
Tests of hypotheses using the ANOVA Mean Square for Subj (Trt)				
Trt	3	8.7375		0.34

Note. Trt = Treatment* $p \leq .004$ ** $p \leq .08$

Table 3

Analysis of variance table for the variable S3 (cognitive score)

Source	df	Sum of Squares	Mean Square	F
Model (Trt x Time x Trt x Time)	43	137.800	3.2046	3.39*
Error	36	34.000	0.9444	
Time	1	20.000		20.18*
Trt x Time	3	1.000		0.35
Tests of hypotheses using the ANOVA Mean Square for Subj (Trt)				
Trt	3	7.600		0.84

Note. Trt = Treatment

* $p \leq .0001$

Table 4

Analysis of variance table for the variable S4 (PPI score)

Source	df	Sum of Squares	Mean Square	F
Model (Trt x Time x Trt x Time)	43	73.5093	1.7095	8.08*
Error	36	7.6125	0.2114	
Time	1	0.9031		4.27**
Trt x Time	3	0.1093		0.17
Tests of hypotheses using the ANOVA Mean Square for Subj (Trt)				
Trt	3	2.7843		0.48

Note. Trt = Treatment

* $p \leq .0001$

** $p \leq .04$

cognitive scores, and PPI scores) were significantly lowered by the treatments, but there were no significant differences among the different tapes. A multivariate analysis of variance procedure (MANOVA) was conducted to test for the same effects across measures. Only the time effect was significant (.0005) on the Hotelling-Lawley trace. No significant treatment effect was obtained, nor was a significant treatment x time effect found.

From the mean scores of each treatment group (Table 5) for each of the four dependent measures (S1 = sensory score, S2 = affective score, S3 = cognitive score, and S4 = PPI score), it is apparent that the four a priori hypotheses of each treatment group affecting its corresponding pain measure to a greater extent than the remaining three treatments are not supported. For the sensory scores, the emotive-imagery group showed the most pain reduction. For the affective scores, the relaxation tape lowered scores the most. Cognitive scores were most reduced by the emotive-imagery tape, and the PPI change was greatest in the control group (Figures 1-4). The null hypothesis of no treatment differences, therefore, cannot be rejected. In view of the lack of significant results regarding the predicted differential treatment effects, various non-significant tendencies were noted for direction and/or possible trends.

Descriptive Analyses

The relative changes between the different dependent scores within each treatment group were calculated. It was felt that this would give an indication, albeit one not attaining a statistical level of significance that was decisively meaningful, of where each treatment was having

Table 5

Mean change scores (pre to post) on variables S1, S2, S3, and S4
for the four treatment groups

Relaxation group	Emotive-Imagery group
S1 5.1	S1 7.0
S2 1.4	S2 0.5
S3 0.9	S3 1.3
S4 0.1	S4 0.2

Cognitive-Evaluative group	Control group
S1 2.8	S1 3.8
S2 0.7	S2 0.1
S3 1.2	S3 0.7
S4 0.25	S4 0.3

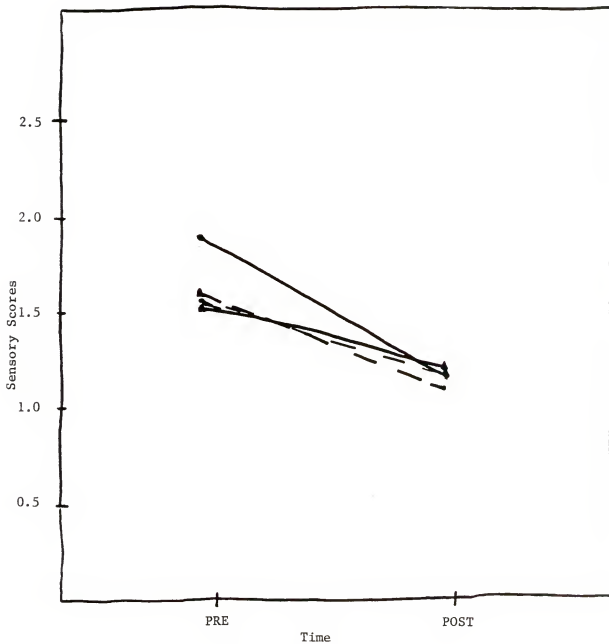


Figure 1. Sensory scores for each treatment group

- Emotive-Imagery group
- - -●- - Relaxation group
- ▲— Cognitive-Evaluative group
- - -▲- - Control group

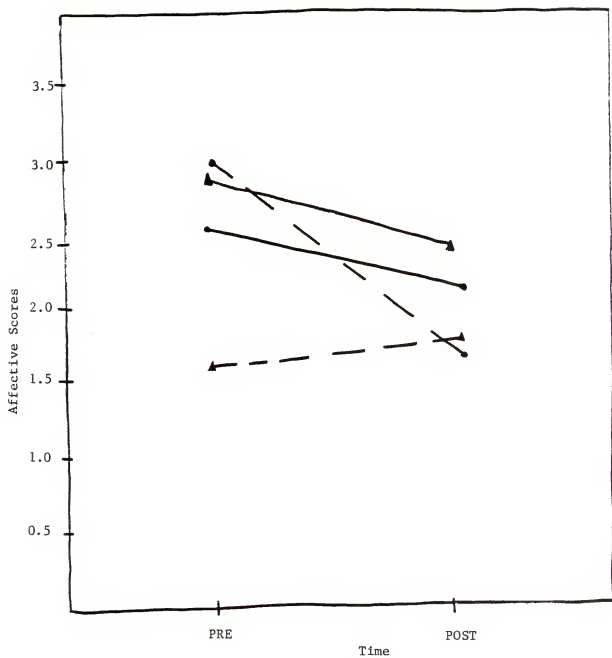


Figure 2. Affective scores for each treatment group

- Emotive-Imagery group
- - -●- Relaxation group
- ▲— Cognitive-Evaluative group
- - -▲- Control group

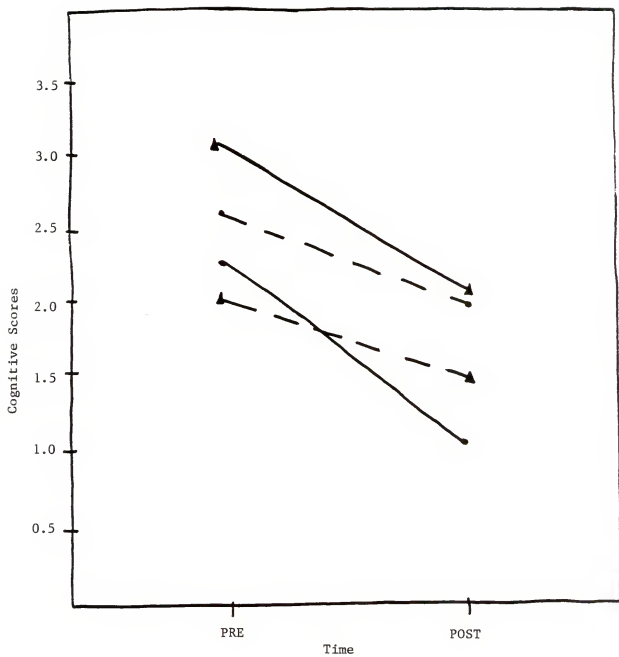


Figure 3. Cognitive scores for each treatment group

- Emotive-Imagery group
- - -●- - Relaxation group
- ▲— Cognitive-Evaluative group
- - -▲- - Control group

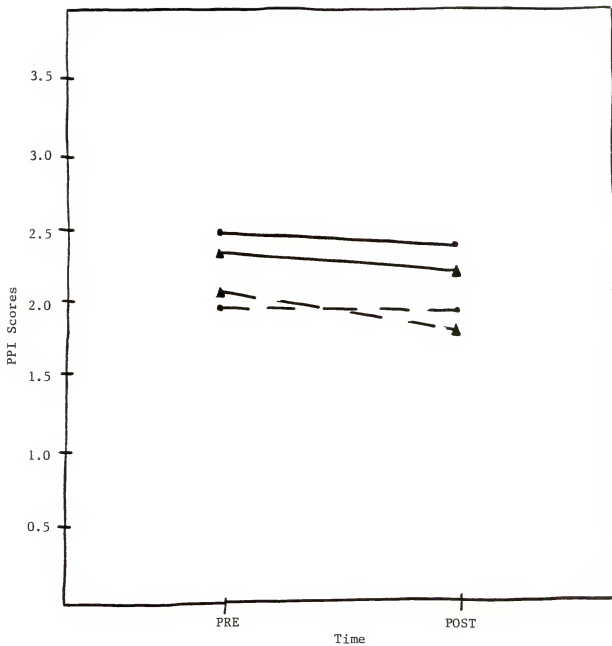


Figure 4. PPI scores for each treatment group

- Emotive-Imagery group
- Relaxation group
- Cognitive-Evaluative group
- Control group

its greatest effect. This was done by first standardizing all scores around a mean of 50 and a standard deviation of 10, and then comparing the different variables within each treatment group. The standardization was necessary because the different variables had different ranges of possible scores. The scores for the entire subject pool were used for a standardization population, and the scores of each treatment group were treated as samples within this population. These means are presented in Table 6. A repeated measures ANOVA found none of the differences to be statistically significant, even at the .25 level of significance. It is very possible, then, that these differences were due to chance alone. The direction of these changes, however, may be noted on the chance that this is not the case. The relaxation tape was most effective in lowering the affective score, the emotive-imagery tape was most effective in lowering the sensory score, the cognitive-evaluative tape was most effective on the cognitive score, and the control group showed the greatest reduction on the PPI score.

The PPI change scores and the sum of the other three change scores were next compared (standardized PPI versus Total: standardized S1 + standardized S2 + standardized S3/3). These comparisons were made to explore any differences between the overall rating of pain intensity and the more descriptive, qualitative measures of change (Figure 5). Changes on these two measures were not statistically different for the four treatment groups ($F(3, 36) = 1.30, p < .25$) as measured by a one-way ANOVA procedure on the Total minus PPI difference scores. As before, however, the direction of the differences may be noted on a purely descriptive level. The relaxation and emotive-imagery groups both showed more change in the descriptive measures (total), whereas the

Table 6

Standardized change scores (mean = 50, SD = 10) within groups

Relaxation group	Cognitive-Evaluative group
S1 50.67	S1 47.02
S2 53.51	S2 50.34
S3 49.25	S3 50.74
S4 48.21	S4 50.59
$F(3, 27) = 1.33, p < .25$	$F(3, 27) = 1.38, p < .25$
Emotive-Imagery group	Control group
S1 53.68	S1 48.61
S2 49.43	S2 46.71
S3 52.24	S3 47.76
S4 49.80	S4 51.39
$F(3, 27) = .46, p < .25$	$F(3, 27) = .71, p < .25$

Note. SD = Standard deviation

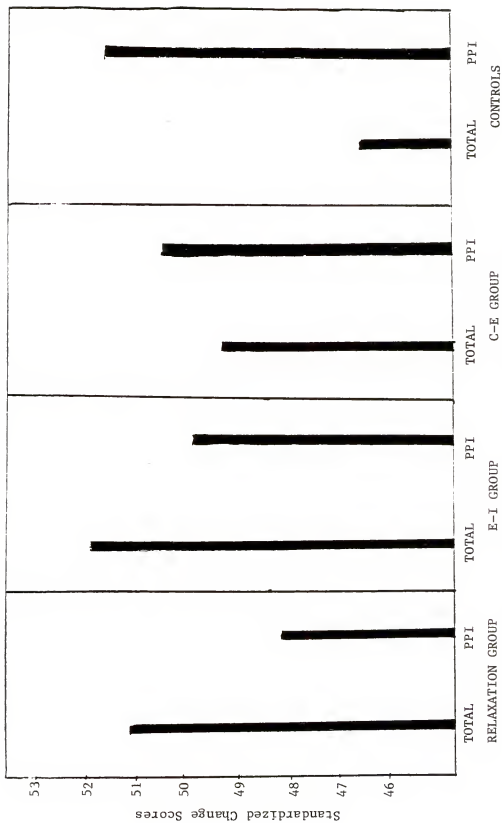


Figure 5. Standardized change scores across groups
(mean = 50, sd = 10)

Total = S1 + S2 + S3/3 F(3, 36) = 1.30, p < .25

cognitive and control groups both displayed a larger PPI change than in the more qualitative, adjectival scores. The largest differences were between scores of the relaxation group and the control group, with the former having a higher total score by almost three points, and the control group having a higher PPI score by almost five points.

In order to see whether treatments were working most in their predicted areas for those patients who were most affected by treatment, the change scores of those subjects who received a PPI change of 1 or more were averaged and compared across groups. There were two subjects meeting this criterion in each group, except for the emotive-imagery group, which had three such subjects. In solely directional terms, this study's third hypothesis was upheld: The cognitive score was most affected by the cognitive-evaluative training tape (cognitive group mean cognitive score = 3.5, relaxation group mean cognitive score = 1, emotive-imagery group mean cognitive score = 2, and control group mean cognitive score = 1.5). Thus, the direction was correct for the cognitive group. The other three hypotheses received no support. With such small sample sizes, however, the meaningfulness of these data is impossible to assess.

Variances around the pre- and post-scores, across the four groups, were calculated with the following results: S1 (sensory score) variances, pre = 51.58, post = 67.25; S2 (affective score) variances, pre = 4.50, post = 5.97; S3 (cognitive score) variances, pre = 1.74, post = 2.15; and S4 (PPI score) variances, pre = 1.10, post = 0.95. Thus, it can be seen that for all scores, except for the PPI score, the post-score variance is larger than the pre-score variance, whereas the reverse is true for the PPI score.

Descriptive Analyses of Secondary Measures

The believability scores of the three treatment groups were also calculated and compared. These scores were responses on a 1-5 scale to the question, "How would you rate the degree to which you 'believed in' the treatment tape and how much it would help you?" The relaxation group obtained a mean score of 3.1, the emotive-imagery group a mean of 3.56, and the cognitive-evaluative group a mean of 4.0. Obviously, this question was not applicable to the control group, as they received no treatment. Thus, the cognitive-evaluative group had the most faith in their treatment tape. A correlation coefficient found a significant relationship (.05) between believability scores and unstandardized change scores for the sensory score, the score which comprises the largest component of the questionnaire's total change measure. Differences between groups, however, were non-significant.

The responses to the question, "What kind of coping strategies did you actually use when you were thinking about your pain and filling out the questionnaire a second time?" were analyzed. All but seven of the subjects replied affirmatively, i.e., that they had indeed utilized the tape treatment. Of those seven who responded negatively, two were in the cognitive-evaluative group and five were in the emotive-imagery group. No subjects in the relaxation group neglected to utilize that skill.

Finally, the one week follow-up data were gleaned for possible trends. Seventy per cent of the follow-up questionnaires had been returned after approximately two months' time. Table 7 reflects the results of these scores, giving the percentages of subjects who maintained or lowered

Table 7

Follow-up scores. Percentages of subjects maintaining or lowering post-treatment levels

	Sensory Score	Affective Score	Cognitive Score	PPI Score	$\bar{X}$
Relaxation group n = 5	80%	20%	80%	80%	65%
Emotive-Imatery group n = 6	16%	33%	16%	50%	29%
Cognitive group n = 10	30%	60%	60%	50%	50%
Control group n = 7	28%	42%	28%	42%	35%

their follow-up score from its post-treatment level. This percentage statistic was decided upon in order that one might obtain an estimate of maintenance of treatment effect. For the relaxation group, 65% of those returned showed overall maintenance of pain reduction, with 80%, 20%, 20%, and 80% maintenance on sensory, affective, cognitive, and PPI changes, respectively. The cognitive-evaluative group attained the second best maintenance level, with an overall rate of 50%, breaking down into 30% sensory, 60% affective, 60% cognitive, and 50% PPI change. The control group was third in their maintenance, rate, with a 35% overall rate, a 28% sensory rate, a 42% affective rate, a 28% cognitive rate, and a 42% PPI rate. Lastly, 29% of the emotive-imagery group maintained overall, with 16% sensory, 33% affective, 16% cognitive, and 50% PPI. Obviously, these scores vary in their validity, as they differ in the extent to which they are representative of their respective groups, with the cognitive group possessing the highest return rate (100%) and the relaxation group possessing the lowest (50%).

CHAPTER FOUR

DISCUSSION

The meaning of these results can be interpreted in several ways. The lack of a significant differential treatment effect may truly represent the lack of differences among the coping strategies under study. The underlying assumption that much of the current pain research (Meichenbaum, 1977; Hackett & Horan, 1980) has attempted to test is that the different coping strategies (somatization, distraction, cognitive imagery, etc.) are indeed working on different aspects of the pain response. It is possible, however, that this is simply not true, and that these methods all reduce pain by the same mechanism, be it a form of distraction, relaxation, or some other common occurrence. For example, Hunter and Philips (1981) suggest the use of relaxation training to reach the affective component of pain, whereas the standard assumption of the Meichenbaum group has been that this form of treatment acts on the sensory component of pain. The present study had speculated, however, that even if the three treatments were not effective in Meichenbaum's "target" areas, their differential effectiveness would be reflected in other pain areas, so that whatever component of pain that they were affecting would be detected. This, obviously, did not occur, as the three categories did not reflect any treatment differences, not just ones differing from those that Meichenbaum's theory would predict. As no definitive support was found by this study, then, this question is one that remains open to future researchers.

It is also possible that the different responses that occur as a result of listening to different types of coping strategies were simply not detected by the McGill Pain questionnaire (MPQ), i.e., that the instrument used was not sensitive enough to detect changes that took place. This is certainly an issue which needs to be considered. In addition to the initially cited research which provided support, albeit guarded, to the adequate reliability, objectivity, and factor structure of the MPQ (Melzack, 1975; Melzack & Perry, 1975; Dubuisson & Melzack, 1976; Crockett, Prkachin, & Craig, 1977, and Leavitt, Garron, Whisler, & Sheinkop, 1978), however, there has been more recent research which provides even stronger support for the MPQ's use as a measure of Melzack's three factors of pain. Prieto, Hopson, Bradley, Byrne, Geisinger, Midax, and Marchisello (1980) factor analyzed the responses of low back pain patients on the MPQ. Four factors accounted for 51% of the total variance. The first one contained seven of the 13 subclasses defined as sensory, and accounted for 77% of what the authors term the "common variance" (51% of total variance). Ten per cent of the common variance was accounted for by the second factor, which consisted of the one subclass designated as evaluative. The third factor contained both affective and sensory items (two from each subclass) and accounted for 69% of the common variance. Finally, 6.1% was attributable to two subclasses of affective descriptors. This study improves upon the methodological weaknesses present in some of the earlier, weaker research. As noted in a review chapter by Bradley, Prokop, Gentry, Van der Heide, and Prieto (1981), the utilization of a homogeneous patient sample, and an increase in the subject-to-item ratio (10:1) substantially improves upon the factor analysis procedure used to assess the MPQ.

Bradley et al. also cite a study by Reading and Newton (1978) in which a card sort method of pain assessment was developed on 200 women suffering from pelvic pain. The adjectives of the MPQ were administered to the subjects, and those commonly chosen as descriptive of "their type" of pain were then divided into categories of similar meanings, and ordering was done by 35 women attending family planning clinics. Unfortunately, it is not mentioned in the study whether or not these women were chronic pelvic pain patients or not. One cannot know, therefore, whether these assessments represent the experience of chronic pain. In the original procedure, however, it is true that Melzack and Torgerson (1971) found their patient sample's ordering of the adjectives to be comparable to that of physicians' and students'. Results from the Reading and Newton (1978) study "generally followed that of Melzack and Torgerson" (p. 506), although the boundaries of the orderings were not exactly the same. At the conclusion of their review, then, Bradley et al. (1981) state that, "In summary, the current evidence suggests that the reliability, validity and objectivity of the MPQ are acceptable" (p. 110).

Other relevant research has addressed different issues surrounding the use of the MPQ. Klepac, Dowling, and Hauge (1981) used eighty college students undergoing either electrical tooth stimulation or cold pressor pain to evaluate the use of the MPQ as a measure of laboratory, as opposed to clinical, pain. The MPQ scores at threshold and tolerance levels were computed, with the expectation being that lower pain scores would accompany the threshold levels, thus providing a test of the MPQ's validity with experimental pain. This prediction came true on two of the three global measures (PPI and PRI) and on three of the four

subscale scores (sensory, evaluative, and miscellaneous). For the affective score, the difference was not statistically significant. Overall, Klepac et al. (1981) posit that their "findings support the utility of the MPQ to describe intensity and qualitative differences in studies of both laboratory and clinical pain, and comparisons among the various 'types' of pain of interest to the clinician and researcher" (p. 206).

Finally, an experiment performed by Hunter and Philips (1981) utilizing the scores of 65 chronic headache sufferers on the MPQ is relevant to the issue of the differential validity of the MPQ scales, i.e., whether or not the scales are indeed measuring different things. The MPQ was administered in the context of a pre-treatment assessment battery. It should be noted that, in a deviation from the prescribed method of administration, Hunter and Philips asked subjects to respond according to their usual pain experience, rather than an immediate pain experience, which is the standard instruction. This was done because of the non-continuous nature of chronic headache pain; although, according to the authors, a large proportion of the subjects were experiencing headache pain during the assessment interview. What is significant as far as the MPQ's subscale validity is concerned is, first, that the scales were differentially significant for the three groups of headache patients studied. For example, only the evaluative scale significantly differentiated between the migraine and tension groups. In addition, using "pain profiles" of the different subclass scores, the authors note that word choices within the affective subclass differed for each headache group, whereas "a fairly similar pain profile emerged for the three groups with respect to the sensory scale chosen" (p. 213). Both

psychiatric headache groups obtained higher intensity ratings on the affective scales, although not significantly so. Related findings are reported in the 1975 Melzack and Perry study, where the different scales were differentially sensitive to treatment change within a given treatment mode--in this case, hypnotic training plus alpha training. This evidence can be interpreted as being supportive of the hypothesis that the three categories of pain descriptors are, indeed, measuring different aspects of the pain experience.

Finally, a recent study by Kremer and Atkinson (1981) has provided evidence supporting the construct validity of the affective scale of the MPQ. Sixty-eight pain patients, of varying diagnoses, were given the MPQ, along with other measures of depression and affect. They found that those patients scoring highly on the MPQ's affective scale also scored highly on the depression and anxiety scales of the Brief Symptom Inventory (BSI) and that this relationship was a statistically significant one. They concluded that, "A reasonable interpretation of this finding is that the affective dimension of the MPQ provides a good summary of the affective states of chronic pain patients" (p. 98). Thus, given these recent, more substantial supports for the validity and accurate factor structure of the MPQ, the possibility that treatment differences occurred, but were merely undetected by the questionnaire, appears unlikely.

Indeed, a third interpretation of the results of this study involves the issue of chronic versus experimental pain, and it is this explanation that the author feels is the most likely one. There has never been any doubt that the treatment and alleviation of chronic pain differs substantially from that of experimental pain (Beecher, 1959).

As noted in the introduction, experimental pain is known to be temporary, and there is no fear of tissue damage. Clinical pain, on the other hand, possesses both of these unknowns. One cannot know when, if ever, the pain will cease, and one does not know whether or not permanent bodily damage is being signified by the pain. Then, too, additional complications arise with chronic pain because of the duration of the pain itself. The patient's entire life is affected: Interpersonal relationships may be strained, and personality changes, due to the constant stress of the pain, often occur (Sternbach, 1974). All in all the continuous nature of chronic pain makes it an all-absorbing experience for an individual. In view of the intensity of the chronic pain experience, as compared to that of experimental pain, it is reasonable to expect that more "intensive" treatment will be necessary in order that the experience of chronic pain be altered, in comparison to that needed to affect laboratory pain. The treatment strategies utilized in the present study are ones that had worked in alleviating experimental pain. Whether or not they could be successfully transferred to the realm of chronic pain was the second major focus of this study. It is in the context of this second issue addressed by this study, then, that one finds the most meaningful interpretation of the results of this experiment.

Indeed, after reviewing the literature on current psychological and behavioral approaches to the treatment of chronic pain, Ziesat (1981) concluded that some type of multi-modal, intense inpatient treatment approach was the treatment of choice for operantly influenced pain, of which chronic pain is typically assumed to be substantially composed. He cites the pain programs begun after the Fordyce model (1976) as good examples. These usually involve multiple treatment components.

Behavioral contracts between patient and therapist, contingency management procedures run on an inpatient basis, daily family group contacts, and time-contingent managing of medication and exercise, are all often included. Additionally, those patients exhibiting a significant muscle tension factor may benefit from concurrent EMG (electromyographic) feedback training. This is frequently the case, for, as Ziesat notes, "whether or not the pain has an organic cause, there are usually physical results from the pain (e.g. muscle tension) which typically, in turn, serve to exacerbate the pain" (p. 291). Thus, it can be seen that this "treatment of choice" is a very intense, prolonged procedure, involving numerous aspects of the pain, such as interpersonal relationship complications, muscle tension "cycles," and medication/exercise management. Obviously, this is a very different matter from the simpler alleviation of experimental, acute pain.

This does not mean, however, that simpler behavioral methods cannot contribute to, or at least partially aid in the alleviation of the pain experience felt by chronic pain patients. Khatami and Rush (1978) conducted a pilot study on outpatient treatment of chronic pain of various etiologies, utilizing less extensive modes of behavioral treatment, such as relaxation training, cognitive modification methods, and instructions to family members to reinforce the more "well" behaviors of pain patients. Treatment, however, extended over approximately 35 weeks. Statistically significant decreases in pain were found for all five of the patients who completed treatment, along with concurrent decreases in hopelessness, medication intake, and depression. However, there were no controls to provide a comparison over any "suggestibility" or "expectancy" effect. Nonetheless, the potential benefits of a shorter,

outpatient treatment for chronic pain patients are demonstrated by this study.

The more "cognitive" strategies have also been researched with regard to chronic pain. Such less "intense," more convenient treatments--if found to be effective--would provide a valuable alternative to the more prolonged, extensive strategies discussed above. Holroyd, Andrasik, and Westbrook (1977) were able to reduce chronic pain in tension headache patients via a program aimed at getting patients to change maladaptive cognitive responses to stressful, anxiety-producing situations, and to replace these responses with ones less apt to trigger and/or enhance muscle tension and pain. This procedure proved to be more effective than either EMG biofeedback or no therapy, in reducing pain duration and frequency of headache. Focusing on a more diverse population of chronic pain patients (e.g. arthritics, amputation pain patients, spinal cord injury patients, and cerebral palsy patients), Rybstein-Blinchik (1979) compared the efficacy of three different cognitive strategies on reducing chronic pain. It should be noted, however, that these patients were inpatients in a rehabilitation hospital setting, hence the strong motivational component that accompanies treatment in inpatient settings was present. A second point that leaves vague the "intensity" aspect of these three treatments is that the total number of sessions is not reported. There were at least three, as the author refers to a given measure having been taken once during the week of the first session, once during the week of the second session, and once following the week of the last session. This remains, however, an unclear parameter, as there is no direct mention of number of sessions.

The strategies compared in the Rybstein-Blinchik study were somatization, relevant reinterpretation of the pain experience, irrelevant reinterpretation of the pain experience, and no-treatment control. All groups of patients (eleven patients in each group) were first given instruction in the Meichenbaum self-instructional approach, with the treatment groups also receiving a conceptualization of their pain as something amenable to change via cognitive coping techniques. Patients were seen in smaller groups of five or six. Following instruction in each group's specific strategy, discussion was encouraged. In addition, group members paired up to do role-playing that would assist them in practicing the strategy. Hence, it should be remembered that the in-patient element of group support for pain change was a factor in this study. Measures of pain change were the MPQ and Pain Behavior observations.

The relevant reinterpretation groups showed significantly "milder and fewer" words on the MPQ relative to the other three groups, with the irrelevant reinterpretation group also showing less pain than the controls. The same differences held for overall ratings of pain intensity. The issue of differentiation among the sensory, affective, and cognitive-evaluative pain components with respect to which treatment the group received was not addressed. On the behavioral observation measures, the relevant reinterpretation group showed significantly fewer pain behaviors than the other three groups. The author interpreted these results as indicative of an especially strong cognitive, as opposed to merely attention-diversion, component in chronic pain, as there was a difference between relevant and irrelevant cognitive strategies.

The extended treatments used in the Rybstein-Blinchik study are obviously more "intense" than the treatment tapes used by Meichenbaum and his associates, and in this study. However, despite the greater intensity of these treatments, the data do support an expectation of treatment effects over controls for the Meichenbaum-type strategies with chronic pain, one that was not found by the present study. Indeed, as noted by Ziesat, ". . . procedures involving covert processes (i.e. cognitive behavior modification (Meichenbaum, 1977) may hold some promise in the treatment of chronic pain. Although there is a growing literature on cognitive techniques in treating acute pain, very little research has been done on helping chronic pain patients modify their self-statements and internal dialogues" (1981, p. 301). And the fact that the transfer of these types of strategies to the chronic pain population of the present study was not as effective as in use with experimental pain subjects (Hackett & Horan, 1980) casts strong doubt on the flexibility of such cognitive-style strategies regarding generalizability from acute/experimental populations to chronic ones. It is very likely, then, that intense treatments are necessary for the alleviation of chronic pain, while they have not been necessary for the alleviation of experimental pain. The results of the present study, then, provide a cautionary note against the premature generalization of the efficacy of simpler treatments with experimental to a similar effectiveness with chronic pain populations.

There are, however, several speculations about this study's data which do merit mention as potential areas for future researchers to investigate. These are based on descriptive data only, and are noted on the chance that directional differences were not merely random. The

most interesting of these concerns the relative changes made by each treatment group on the PPI score versus the total combined scores of the three adjectival scales. The two groups which reported more overall "judgement" change (PPI change) over descriptive change (adjective scores change) were the cognitive-evaluative group and the control group. In other words, when reporting on pain reduction, these two groups rated their change as greater when assessing it with cognitive measures than when assessing it by actual descriptions of sensations. The cognitive-evaluative and control groups may be making more of a "judgement" shift. They are showing more change in their overall evaluation of their pain experience. The relaxation and emotive-imagery groups may be making more of an "experiential" shift. They exhibit a greater shift in how they describe the sensations and the physical experience of pain. Aspects of the experience that precipitated the decrease in pain for the control group (e.g. cognizance of participation in a medically linked pain experiment, talking about and describing one's pain, focusing on the experience of one's pain) may be most similar to those influences operating to alleviate the pain of the subjects in the cognitive-evaluative group as well. In addition, the cognitive-evaluative group was the one reporting the most belief in the efficacy of their treatment. It can be hypothesized, then, that if these "judgement" changes are different from the changes operating in the relaxation and emotive-imagery treatment groups, and not due to mere chance, then what the cognitive-evaluative training is doing, in effect, is instructing the subjects to create their own "suggestibility" effect. It may be training subjects to anticipate pain reduction, which is often followed by a perception of pain reduction. This observation is, obviously, not a

surprising one. However, it does point out the real value of recognizing and utilizing, rather than eliminating and/or ignoring, the placebo-expectation effect in work with chronic pain patients. It also provides researchers with a firmer idea of exactly what mechanisms are operating in the cognitive-evaluative treatment strategy, possibly even on a neurological level, in the terms outlined by Melzack and his associates.

A second speculation that emerges from this descriptive data concerns the question of which of the treatment tapes achieves the most success at reaching its "target" component of pain, allowing for the weakness of all of the treatments. The cognitive-evaluative tape appears to do this. Two bits of evidence point to this tendency. Firstly, for those subjects receiving a PPI of 1 or more, the pain change on the cognitive measure is greater for subjects in the cognitive-evaluative group than for any other treatment group. In other words, the cognitive-evaluative treatment is addressing the cognitive component of pain more than the other two treatment tapes are. Additionally, when one observes the within-group variations between standardized measures, the cognitive-evaluative group exhibited the most change in its "appropriate" area, relative to the other components of pain, and the other treatment groups did not. Thus, the direction was correct in the cognitive realm, even though the differences were non-significant. Thus, the reasonable hypothesis can be posited that the cognitive-evaluative tape is the treatment that is the best targeted at its corresponding area.

Little can be said regarding the follow-up data. The fact that only 50% of the subjects in one group (relaxation group) had returned their questionnaires at two months post-experiment casts substantial

doubt as to the representativeness of the data that were returned. Only the cognitive-evaluative group had all ten subjects return the questionnaire. Of these ten, 50% had maintained or lowered their post-treatment scores. The most that can be stated, then, is that at least some of the subjects are maintaining the reduced pain level that they were experiencing following their initial treatment session.

The final topic to be discussed is the limitations of the study, which include both design problems and procedural difficulties. As in many studies, the power of this research could undoubtedly have been increased with a larger sample size. The fact that there were only ten subjects in each group most certainly limited the power of this study's design. Secondly, the simultaneous investigation of two different problems by this study (experimental versus chronic pain and relative change among pain components) does not permit, unfortunately, unchallengeable conclusions as to whether the population shift (experimental to chronic) masked the differential nature of the treatments, or whether they were truly not reflected in the MPQ, or whether they truly do not exist. The MPQ needs to be administered to experimental pain subjects undergoing the three treatment strategies. Whether or not one needed to then shift to a chronic pain population would depend on the results of the first study.

It will also be necessary for future studies dealing with chronic pain patients to use more intensive versions of the coping strategies under investigation. It is the author's belief that it was the lack of this that resulted in the lack of treatment effect over controls with chronic pain, as there was a substantial treatment effect when the same procedures were conducted with experimental pain patients

(Hackett & Horan, 1980). In addition, the inclusion of physiological measures that relate to the pain syndrome being studied, such as joint temperature in arthritis patients, or EMG level recordings in tension headache patients, would be quite helpful. Obtaining these types of measures along with the MPQ could provide even more evidence as to the validity of the instrument, particularly if the physiological measures corresponded primarily to the sensory scale of the MPQ.

Lastly, on a more practical level, some insurance that subjects will actually use the strategies in which they are instructed needs to be incorporated in future studies. In both the Hackett and Horan study, and the present study, a substantial number of subjects reported not utilizing the strategies. Obviously, this occurrence could greatly affect the validity of any results that are obtained. For example, in the present study, half of the subjects in the emotive-imagery condition reported difficulty with the use of the strategy. Needless to say, obtaining this response from such a large proportion of the subjects in a single condition makes it very difficult to draw any strong conclusions from the performance of this group.

In summary, then, several mitigating factors have limited the strength of the statements that can be made by this study. The speculation can be posited that the cognitive-evaluative strategy acts through mechanisms similar to those operating with no treatment control subjects in reducing pain levels. The cognitive-evaluative strategy may also be the treatment that reaches its corresponding component of pain most efficiently, although both this and the previous hypothesis are tentative ones based on differences in the data that do not attain statistical significance. However, meaningful statements can be made

with regard to the generalizability of the coping strategies developed by Meichenbaum to deal with the pain experience. Chronic pain patients apparently require a more intense form of treatment than do experimental pain subjects, in order that their alleviation of pain be meaningful. This conclusion merely serves to emphasize the already established fact that the experience of chronic pain, and that of acute/experimental pain, differ in numerous ways, not the least of which is the extensiveness with which the pain permeates the individual's life. This, in turn, influences and colors the perception of any alleviation, or even attempt at alleviation, of the pain. Recognition of this difference needs to be taken into account in future pain research, and the incorporation of this fact into the experimental design of such research will hopefully aid in the search for the answer to this study's, and other, relevant questions.

APPENDIX A
INFORMED CONSENT FORM

INFORMED CONSENT

Behavioral Strategies for Coping with Pain: Issues in Measurement and Evaluation

You will be part of a study investigating the effect of different ways of coping with pain. These different methods have been found to be useful in alleviating pain in other research. The current study is aimed at evaluating their effect on pain in a clinical population.

Your task in this study will be to first complete a pain questionnaire describing "What your pain feels like," along with questions concerning your current drug usage and the course of your disease. You may then be assigned to a no-treatment control group, or instructed in specific methods of dealing with pain, pre-recorded on tape. These will involve either special ways of thinking about your pain, or relaxing exercises designed to mediate your pain experience temporarily. None of these methods have been associated with discomfort. You will be asked to fill out the questionnaire a second time, along with a sheet asking various questions about your experience and your typical pain. One week following this procedure, you will be mailed the pain questionnaire for one final completion, with a stamped, addressed envelope. Upon receipt of the questionnaire, a complete explanation of the aims and purposes of the study will be sent to you. A phone number will be included so that any additional questions can be answered. This will conclude the study.

Research has not documented any risks associated with these procedures. However, if for any reason you find yourself feeling uncomfortable during this experiment, please inform the investigator. Any anxiety that may result from this experiment will be handled by the provision for referral sources by the investigators. Any questions you have will be answered as fully as possible. You will have the option to withdraw your consent and to discontinue your participation in this project at any time. No compensation will be given for your participation in this project, and it is in no way affiliated with your treatment or physician's care.

I have read and understand the above described medical procedure in which I am to participate, and have received a copy of this description.

In the event of my sustaining a physical injury which is proximately caused by this experiment, no professional medical care will be provided me without charge.

Signature of subject _____

Signature of witness _____

Date _____

APPENDIX B

PRE-SESSION QUESTIONNAIRE

PRE-SESSION QUESTIONNAIRE

Please rate the severity of your arthritis problem, using the rating scale below.

1	2	3	4	5
Minimal	Mild	Moderate	Severe	Extreme

Please list below any medications or drugs that you are currently using.

APPENDIX C
TAPE TRANSCRIPTS

Introduction

For the next few minutes, you are going to be listening to a tape designed to help you deal with your pain. It will talk about a different way of thinking about pain, a way which may help you to cope more effectively with your current pain experience.

Tape 1 (Relaxation Training)

You can learn how to relax by simply listening to my voice and following the instructions that I give you and allowing yourself to relax. Try to get as comfortable as possible in your seat; move your body around and allow yourself to be just as comfortable as you can. If you find you're not completely comfortable, move around a little bit until you are so that you can begin to relax. In order to learn to relax, we will describe to you sixteen muscle groups and ask you to tense and relax each muscle group one by one. By the end of that exercise you will find that you're deeply relaxed, very deeply relaxed. If you find yourself thinking, that's okay. Just allow the thoughts to go on through your head and you'll find that you come back to your relaxation.

Now, close your eyes and begin to allow yourself to become deeply relaxed. Turn your attention in. Pay attention to yourself, shutting out the world for a little while. We focus outward so much of the time that we often forget to focus on ourselves and attend to our own feelings. Now, pay attention to your breathing . . . to the pace of it, to how deeply you can breathe. In and out, in and out . . . you'll find after a while that you can slow your breath and that your pattern of breathing will become deeper and slower. Deeper and slower, as you get more and more relaxed.

As you pay attention to the first group of muscles, make a fist with your right hand. Make a fist and tense the muscles of your right hand and forearm until they tremble. Feel the muscles pull across your fingers and into your forearm. Now hold it (pause). Good, now relax. Pay attention to the muscles of your right hand and forearm as they relax. See how those muscles feel as relaxation flows through them, as they become more and more relaxed. Now tense your right upper arm muscle. Tense it hard and hold it (pause). Now relax. Let the muscle in your right upper arm become deeply relaxed, very deeply relaxed. Experience the sensation of deep relaxation. Pay attention to how those muscles feel when they are deeply relaxed. See if they feel the same as your right hand. Notice how they feel the same.

Now make a fist with your left hand and forearm. Tense these muscles and hold them tight. Hold them . . . now relax. Let the muscles of your right hand and forearm become deeply relaxed. Notice how they feel as they become more and more relaxed so that you can become familiar with the feeling of deep relaxation. Now tighten your left upper arm. Make these left biceps tense and hold it; hold it tight. Now relax. Notice how your left upper arm feels the same or feels different from your left hand and forearm as your muscles become more and more relaxed, very deeply relaxed.

Lift your eyebrows now and frown hard, tensing the muscles in the forehead and top of the head and hold it. Hold the tension there. Now relax. You may feel a little tingling as these muscles begin to relax. Wrinkle your nose and squint your eyes . . . notice the tension in the muscles across your cheeks and upper lip. Hold that tension. Now relax.

Let the muscles across your face become soft and loose and deeply relaxed, more and more relaxed.

Draw the corners of your mouth back and bite down a little on your teeth. Feel the jaw muscles tense. Hold the tension . . . now relax. Feel the sensation of deep relaxation as the muscles of your jaw, your cheek, your tongue, all across your face become more and more relaxed, very deeply relaxed . . . soft and loose. Pull your chin down to your chest. Tighten your chin and throat muscles and hold them. Feel the two muscles in the front of your throat. Hold that tension, now relax. Feel your chin and throat muscles become slack and loose as they become deeply relaxed, more and more deeply relaxed. Notice the sensation of relaxation. Notice how those muscles feel similar to those in your face, or perhaps different in how they are relaxed. Let them become deeply relaxed, more and more relaxed. Pull your shoulder blades back together to tighten the chest muscles and those muscles across the back and hold that tension. Now, relax. Feel how the muscles pulled below the shoulder blades, feel the relaxation as they become soft and loose and deeply relaxed. Notice how they feel different from when they were tight. Experience the sensation of deep relaxation as you focus on those muscles, those of the chest and shoulders.

Tighten your abdominal muscles. Make the abdomen hard and hold that tension. Hold it . . . now relax. Let the muscles of the abdomen become soft and relaxed, very deeply relaxed, more and more relaxed. Notice how those muscles become more and more comfortable, more and more deeply relaxed. Allow the sensation of deep relaxation to flow throughout your body into all the muscle groups that we have focused on. Let them become more and more relaxed, more and more relaxed. Tighten the muscles of the right upper leg, pulling the one muscle on top and the two on bottom and hold them tight. Now relax. Let the muscles of the right upper leg become soft and warm, deeply relaxed, more and more relaxed, very deeply relaxed, all the muscles of your right upper leg. Experience the sensation of deep relaxation.

Pull up the toes of your right foot and tighten the calf of the leg. Feel the tension pull the muscles of the back right calf and hold it . . . now relax. Let the calf of the leg become deeply relaxed. Now experience the sensation of relaxation as the muscles become loose and warm and deeply relaxed.

Push down on the toes of the right foot and arch that foot, as if something were pushing up under the arch of your foot and hold it. Now relax. Relax your foot, relax the heel, the bottom of your foot and the toes. Let those muscles become deeply relaxed. Let the relaxation flow through your whole right leg and foot. Let them become more and more relaxed, deeply relaxed, very deeply relaxed. Notice how good it feels to be very, very relaxed.

Turn your attention now to your left upper leg. Tense the muscles of your left upper leg, the one muscles on top and the two underneath and hold it. Hold that tension, now relax. Notice how those muscles feel as they lose their tension and become deeply relaxed. More and more relaxed as you attend to the sensation of deep relaxation.

Now pull up the toes of the left side and feel the muscles tense in the left calf muscles and hold them really tight, hold them. Now relax. Let the left calf of the leg become soft and loose and deeply relaxed. Notice the sensation of deep relaxation as the left calf of the leg begins to become deeply relaxed. Push down on the toes of your left foot and arch your foot. Feel the pressure as if something were pushing up on your left foot under the arch and hold it. Now relax. Relax the left foot, relax the heel, relax the ball of the foot, relax the toes. Experience the sensation of deep relaxation as your whole left leg and foot become deeply relaxed, very deeply relaxed, more and more relaxed.

Now pass your attention briefly over your body beginning with your feet, moving up to your legs. Notice any little spots of tension and let them go through relaxing. Now the muscles of the chest and abdomen, the back. Relax your shoulders, relax your throat, your cheeks, your jaw. Relax the muscles of your face, around your eyes, behind your eyes. Relax your scalp. Let the relaxation flow from your shoulders down into your upper arms, your forearms and hands. Allow your body to become deeply relaxed, very deeply relaxed. Enjoy the sensation of deep relaxation.

(Minute-long pause)

Now, as I count back from five to one, you will begin to become aware of the world around you. You will become more and more alert. As I count three, you will move around a little. And when I reach one, you will open your eyes, alert to the world, but very deeply relaxed and comfortable, relaxed and comfortable. Five, four, three, two, one. Wake up.

Tape 2 (Emotive Imagery Tape)

For the next thirty minutes, I am going to be asking you to imagine various scenes that I describe. I will be describing them in great detail, so that you will be able to imagine them in your mind very vividly. Try hard to imagine them as vividly as possible, trying to experience the feelings and sensations that you might experience if you were really living the scene.

Begin by making yourself as comfortable as possible, letting all thoughts and concerns flow out of your mind, in order that you may pay full attention to the scenes that are being described. Just get as comfortable as you can.

I want you to imagine that it is a calm summer's day. You are lying on your back, on a soft lawn. You are watching the fleecy white clouds move slowly overhead. You notice especially the brilliant edges of the clouds against the bright blue of the summer sky. The white and the blue are a dramatic contrast. As you lie there, you can feel the grass on your face, tickling in a pleasant sort of way. A slight breeze is moving through the trees around you, and across your face, making you feel cool and comfortable. A bird soars into the sky, and you watch it cross the whiteness of the clouds. The puffy clouds are just moving along across the sky, like giant balls of cotton in a sea of blueness.

Now imagine that you are near a river's bank, lined with tall trees. You are watching a fallen leaf bob around erratically in the water, moving up and down in rhythm to the movement of the river. As you watch, a second leaf falls from one of the trees and slowly lands on the surface of the water, breaking its smoothness for a moment, and then patterning itself after the other leaf by beginning to move around with the water, following its eddies and movement downstream. The two leaves continue to flow down the river, occasionally coming against a rock or other obstacle jutting out of the water, until they slowly disappear out of your sight, leaving the river once again smooth and clear.

Imagine a rainy spring day. You are watching the raindrops race down the windowpane as you sit by the window looking out at the world. The raindrops strike at the top of the pane very abruptly, and then trickle rapidly down to the bottom, where they merge with the tiny rivers of rainwater flowing off of the window onto the ground. Patterns are formed by these tiny rivers of drops as they find their way down the glass, patterns that criss-cross and weave about, changing all the time. The world outside looks very shiny and wet, but you feel very warm and dry inside your house. You can also hear the drops hitting the pane, very softly, like tiny little thuds of water. Their sound is very steady, though, and it creates a soothing rhythm to the rain. You can see the puddles outside absorbing their own raindrops, one by one, and feel very cozy and content to sit and watch as nature renews its elements.

Imagine that you are standing on a busy street corner on a very pleasant summer morning. You can see cars, buses, trucks, and traffic lights as

you stand and watch the hustle-bustle of a city getting itself to work in the morning. The people seem alive, and ready to go. There is a park on the other side of the street, and some children are walking through it on their way to school. They are singing songs and playing games as they go, and it makes you feel very carefree and happy to watch them pass. A man signals a taxicab, and hurriedly gets in to make his appointment on time. People seem to be scurrying to get to their destinations, and a policeman in the intersection is motioning cars and pedestrians so that everybody can move and find their way. As the policeman waves them on, all the autos move forward with a lunge, whizzing past you. The morning is very much alive, and you feel part of it.

Imagine that it is a very cold night, and you are sitting around a fire-place in which you have built a fire with several heavy logs. Try to get a clear image of the fire, and imagine the warmth of the dancing, darting flames. Bright blue where they start, the flames turn to a fiery orange, and then yellow as they reach up into the air and disappear. The crackling of the logs sounds in the background. The flames surround and eventually envelope them, turning them from hard, heavy wood into soft, collapsible ash. You feel very warm and cozy next to the fire, as you hear the wintry wind outside hurling itself at the walls of the house. But the warmth of the fire protects you, and you continue to watch the dancing of the flames and enjoy the rhythm of their movement and the brightness of their fire.

Imagine that it is a moonlit night, and you are looking out across snow-covered fields. The moonlight dances on the snow, like shimmering diamonds, brilliant and white. It forms one stream of light, reaching from its place in the sky across the snow down to the fence on which you are leaning. As you look out across the fields, you can see small dots of darkness that are twigs poking out from under the blanket of snow to catch some of the silver gleam from the moon overhead. Everything is glimmering like shiny crystal on this cold and quiet night. Even the dots of light that are the stars on the background of the sky are still, save for their slight twinkling as they watch. The snow has hushed the earth for a while, making it quiet and still, with only the dancing of the moonlight on the crystals of icy snow and the winking of the stars left to stir the air this night.

Imagine that you are sitting in the middle of a field of colorful flowers, and a gentle breeze is blowing through, swaying the different colors of pink, white, and ruby red as it descends. The warm colors are like a kaleidoscope as they turn, forming new and different patterns as they are softly tossed about by the breeze. Even the fragrant smells merge and form patterns of sweetness and scent as the wind carries them around. Delicate pinks are contrasted with brilliant reds, and they are both softened with the purity of the white flowers, all moving together and then apart, as they are guided by the direction of the aromatic breeze.

Imagine yourself walking in a forest of huge redwood trees. As you walk, you are awed by their towering presence as they reach towards the sky like long Gothic towers. You feel small, but a part of the forest. You look up, following the lines of the trees, and are surprised when the

bright blue sky finds a spot to peer through the trees into the forest. Looking around you now, you are also surprised at the activity in the forest. Squirrels are squawking as they gather their nuts; birds are chattering as they build their nests and dart about; and brush and leaves crackle under your feet as you walk along your path. It is cool and dark in the forest, a world of its own.

Imagine a warm and balmy summer's day, and that you are sitting on the beach watching the shore and enjoying the cool breezes and warm sun as you sit and relax. A mother and her young child are playing in the sand next to the water, and the child spills its pail of water and begins to cry, only to be comforted by its mother with a fresh bucket of ocean water. Cries of seagulls overhead add to the atmosphere of the beach and you feel happy and relaxed to sit and watch your surroundings. Out along the horizon, there is a sailboat that seems to be sitting still against the sky, like a painted picture. The sand feels cool and grainy between your toes as you dig your feet into it as you sit. The saltiness of the air refreshes you, and the ocean itself seems to give off a feeling of summertime and beachiness, as the gentle but unending waves add a rhythm to the serenity of the scene.

See yourself now sitting in a comfortable chair watching a little kitten sleeping curled up on the rug in front of you. It is sleeping very peacefully, its long tail wrapped around the circle it has made itself into. You can see the rhythmic breathing of it as it naps. Its fur looks soft and fuzzy; its nose is pink and moist. A faint purr comes from the kitten, and watching it sleep makes you feel very warm and content. It moves once, to wash its face and rearrange its position. Then, it turns around and returns to its peaceful sleep.

It's a spring day, and you are looking at an old mill on the edge of a small wooded area. You can see the water wheel on the side of the mill. The water wheel is lazily turning, and you can hear the water splashing on the rocks below. There is one continuous motion, as the water is picked up by the planks of the wheel, only to fall back down as the wheel continues to turn round and round. An old cobweb spans the corner of the millhouse, letting you know that the mill is not a new one. The wood of the mill also belies its age, as the cracks and knots of each piece are perceivable.

It is right after a spring rain. You are walking through the grass with bare feet. The grass feels wet and cool on your feet, and the ground is soft. The rain has given the ground a very clean scent, a very fresh, moist scent, and this goes along with the squeaky clean feeling of the wet grass. Everything about the earth looks washed and refreshed, and the earthy smells of the field add to your feeling of renewal.

Table 3 (Cognitive-Evaluative Training)

For the next several minutes, I am going to be talking to you about a way of thinking about your pain that can be somewhat helpful in mediating painful experiences. It entails learning to view the pain as a stressful occurrence, one which can be mentally prepared for, confronted and handled, and one which is accompanied by feelings of helplessness and loss of control which can be coped with in different ways.

Let me explain the thinking behind this method. There are many different ways that you can think about your pain. You know that it hurts, and that it is always there. When you pay attention to your pain, you may tend to use self-statements--or sentences that you say to yourself--which are negative or pessimistic, such as "Oh, this is really hurting." "I can't take anymore," and so on. Statements like these are generally self-defeating, in that they create a negative set, or way of thinking about your pain, that encourages a very hurtful interpretation of the sensations called pain. By learning to stop using these types of self-statements and replacing them with more positive, aggressive thoughts, you can begin to cope with your pain in an easier fashion.

Recent theories about pain have come up with a framework for viewing the experience of coping with pain as one which involves multiple stages. One begins by accepting the pain as just another stressor. The word "stressor" is used here to mean any event or occurrence that causes tension or anxiety; in other words, anything that causes stress. Examples of some more everyday stressors would be an argument with your boss or a breakdown of your car. Just like any other stressor, then, your pain can be dealt with in a series of stages. Let me talk about these stages one by one so that you can better understand them.

Some pains are temporary, and can thus be prepared for. For this type of painful stressor, mental preparation is often the first stage.

However, the more chronic type of pain, such as yours, doesn't really have starts and stops. Therefore, you can begin to handle the stressor of chronic pain more effectively by starting with the second stage of confronting and handling your pain. To do this, one needs to recognize the maladaptive effect of any negative self-statements one is making about confronting and handling one's pain, and replace them with more positive ones. Do not allow yourself to dwell on any fears you have about controlling your pain. This will only accentuate the anxiety that can accompany a painful experience. Think in a more positive and aggressive manner about your own ability to cope with your pain. Statements that one might make to oneself in order that one might cope more adaptively would be ones similar to the following:

I'm in control here. The pain can't get the better of me.
It is something that is happening to me, but it has not taken over control of me. There are many things that I can do and think about that can diminish how much pain I feel. I can think about other things, I can relax my muscles and

loosen up my body, and I can try to think of the pain as something else, some other sensation. Additional anxiety only augments my pain, so I'm just going to relax and try to ignore it. This pain is nothing new to me. I've been handling it for a long time now, and I know I can continue to do so. It may be a nuisance, but it is one that I can control.

By telling ourselves that we are indeed in control of ourselves and our pain, we can feel a sense of mastery that can help us through the pain experience.

In the next stage of handling pain, one concentrates on coping with difficult feelings that occur at certain critical moments during the pain. As you know, your pain comes and goes, sometimes hurting more, sometimes less. Being able to buoy oneself up to stand the pain at these "critical moments" is very important. Giving yourself the confidence of knowing you can get through these critical moments can be obtained by replacing the negative and pessimistic things that you may say to yourself when the pain gets very bad with statements that support your ability to survive the bad moments of pain. Statements of this sort might be

When my pain increases at a given moment, I'll just keep focusing on my ability to handle it. I know I can. I've done it before. I don't have to eliminate all of my pain; if I can just control it for this bad time, I know I'll be all right. It only gets real bad for a few seconds, and then it's okay again. It's not really the pain intensity increase that is upsetting, it's my fear about the pain increase. If I can just control my reaction to it, I'll survive. If the pain mounts, I can always start thinking about something else or daydreaming to get me through the worst parts.

By substituting these kinds of statements for the worrisome ones that you frequently say to yourself, you can create the atmosphere needed to control your pain in a more effective fashion. By listening to statements such as these, and keeping them in mind when you are experiencing pain, you can greatly increase your ability to deal with your ongoing pain.

Finally, the last stage of this framework of pain as a manageable stressor encourages one to acquire the habit of reinforcing, or rewarding oneself for being able to deal with the pain adequately. Instead of seeing yourself as the victim of a hurtful pain, you can see yourself as a survivor, one that has undergone a negative stressor, and yet managed to come through in one piece. Praising yourself for this accomplishment can help put the pain in perspective, and give you the needed distance from it. This concurrently makes you feel good about yourself, and feeling good about yourself can, in itself, help you to cope with day-to-day pain as you experience it. Statements that you might want to use and say to yourself in this stage include:

Good for me--I did it! I am handling the pain pretty well.
I can conquer the pain just like I knew I could. Wait until
I tell my spouse how well I was at overcoming my pain today.
I can take it, no big deal. I'm really something for getting through this so well.

Using these types of reinforcing self-statements, then, can help a great deal as an aid in allowing one to experience less intense pain.

You have heard, then, how we can learn to better deal with our pain by substituting negative things that we say to ourselves with more positive statements that help us confront and handle our pain, and then reinforcing us for our success. By making a habit of this way of thinking, we can gradually change the manner in which we think about our pain, and hopefully learn to deal with it in a more adaptive and less hurtful manner.

APPENDIX D

POST-SESSION QUESTIONNAIRE

POST-SESSION QUESTIONNAIRE

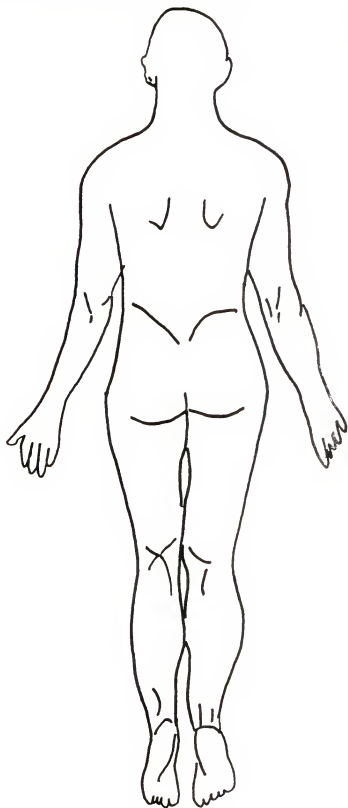
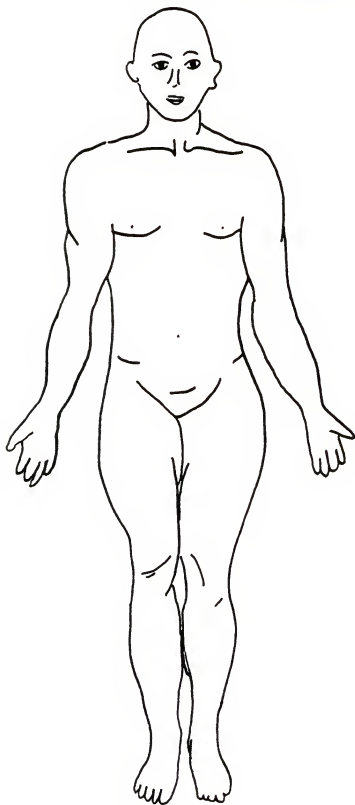
1. On a scale from 1 (not very helpful) to 5 (extremely helpful), how would you rate the usefulness of the pain strategy you have just learned?
2. On a scale from 1 (not very believable) to 5 (extremely believable), how would you rate the degree to which you "believed in" the treatment tape and how much it would help you?
3. What kind of strategies do you usually use to cope when you are in pain?
4. What kind of coping strategies did you actually use when you were thinking about your pain and filling out the questionnaire the second time?
5. On the attached sheet, please indicate the places on your body where you usually feel pain.

APPENDIX E

PAIN SITE BODY DRAWING

Where is your pain?

Please mark, on the drawings below, the areas where you feel pain.



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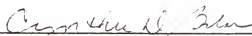
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BIOGRAPHICAL SKETCH

Elyse Parks Sutton was born on May 29, 1956, in Norfolk, Virginia. She attended grammar and high school in the Norfolk area, and in 1973 moved to Charlottesville, Virginia, to attend the University of Virginia. There, she was graduated with high distinction with a Bachelor of Arts degree in psychology and religion and was also elected to the Phi Beta Kappa society. In 1977, she began her professional training in the clinical psychology program at the University of Florida in Gainesville, Florida, receiving her Master of Arts degree in June, 1980, and her Doctor of Philosophy degree in August, 1982. She is currently interning at the Boston Veterans' Administration hospital in Boston, Massachusetts, where she is continuing her work in the areas of behavioral medicine and dynamic psychotherapy.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.



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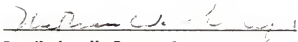
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